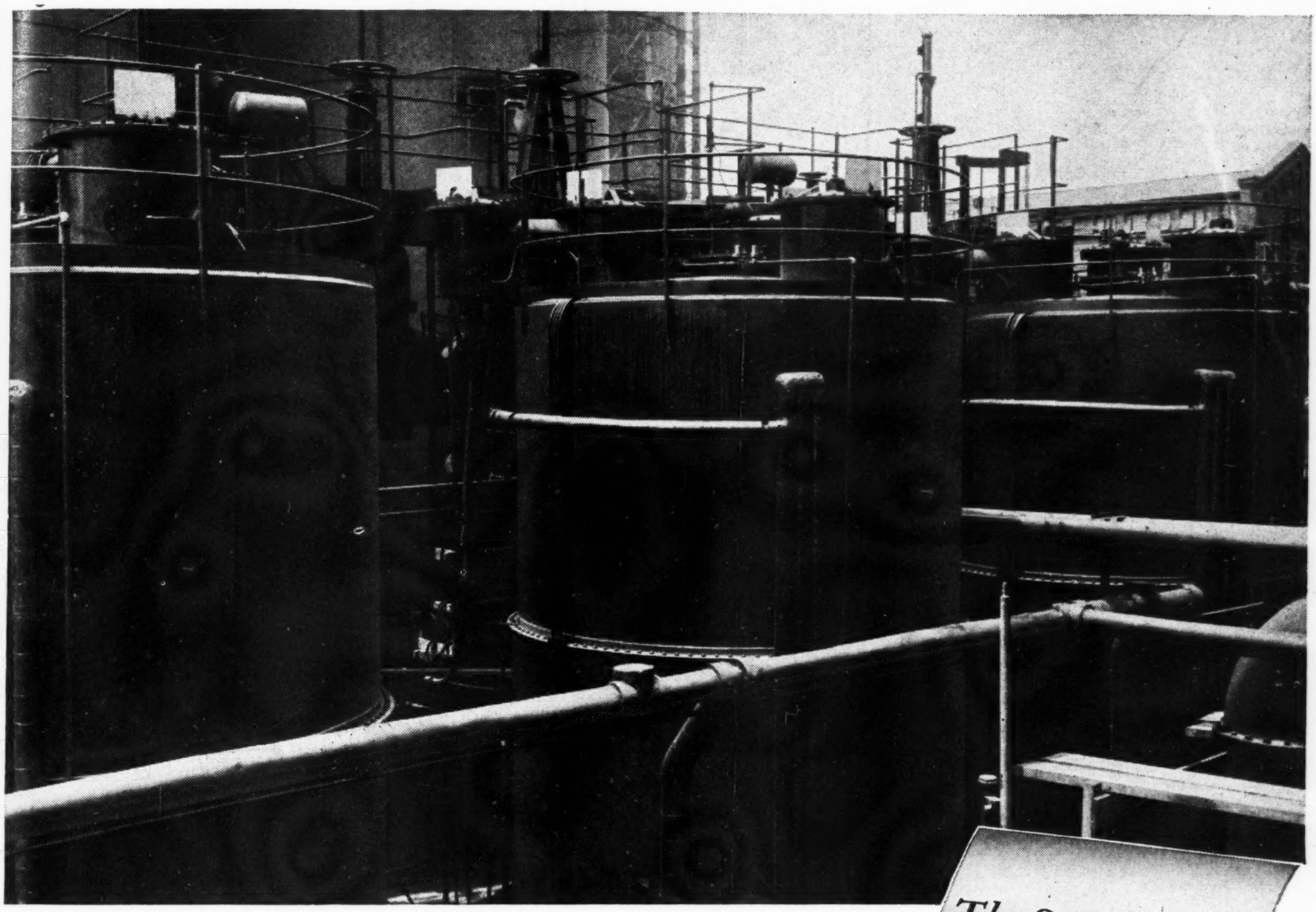

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GAS

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A JENKINS PUBLICATION

Twenty-Fifth Year of Publication

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Highlights

SCRATCH ONE PIPELINE. Gulfcoast Northern Gas Co.'s year-old application for a line running 1184 miles from Texas fields to Illinois went into the FPC wastebasket last month. Failure to prosecute the application motivated the commission's action. The $119-million line was to provide 245 MMcf initially, 350 finally, to Natural Gas Pipeline Co. of America, People's Gas Light (Chicago) subsidiary, for distribution in the Windy City area. However . . .

ONE PIPELINE MAY BE ADDED TO THE SCOREBOARD, FPC WILLING. Texas Illinois Natural Gas Pipeline Co. made formal application to FPC for a 1018-mile line (plans for which were previously announced) from around Houston to Joliet, Ill., connecting there with Natural Gas Pipeline Co. of America's eastern terminus. Texas Illinois is another Peoples subsidiary. (See "Pipeline News" in this issue.)

NATURAL GAS EDGES CLOSER TO NEW ENGLAND. Although when the FPC okayed Tennessee Gas Transmission Co.'s line to Buffalo it dismissed "without prejudice" the concurrent plan to extend the line to Boston, the fact that the Buffalo line will now become a reality seemingly triggered a flock of actions and rumors. TGT immediately pressed a new petition for the Boston line; Northeastern Gas Transmission Co. was formed to link TGT and Transcontinental (Texas-New York line operators) with Northeastern distributors; Minute Man Gas Co. was reportedly trying to get a foot in the door, and many, many rumors were flying. (See "Pipeline News" in this issue.)

GAS LIQUEFACTION PLAN WINS FPC NOD. Chicago District Pipeline Co.'s idea for a natural gas storage plant now has the commission's blessing. (See "Pipeline News" in this issue.)

"GAS FACTS" FOR 1948 IS OFF THE PRESS. The third edition of the AGA statistical yearbook is being distributed. It's a grand job.

EXPORT MACHINERY SET UP, BUT CHIEF OPERATOR ON STRIKE. Alberta, as reported last month, legislated a setup for grinding out gas export permits. But Premier E. C. Manning is determined to prevent issuance of any franchises until he is satisfied the Canadian province's reserves are sufficient.

NATURAL GAS FOR RICHMOND AND NORFOLK, VA., TO BE CONSIDERED THIS MONTH. Three pipeline applications are being consolidated for Septembe hearing (See "Pipeline News," in this issue.)

BALTIMORE MAY GET NATURAL GAS THIS SPRING. The pipeline from West Virginia to Rockville, Md., has been okayed. (See "Pipeline News" in this issue.)

NATURAL GAS AMENDMENTS SHOWING THEIR MUSCLES. Despite dire predictions after last November's national elections, the twin attempts to get an amendment through Congress have met with surprising success. The House passed its version last month; the Senate bill may die for lack of priority as the current session is jammed. A few predictions appear in "Thermally Thinking."

AND NOW 36-IN. HIGH PRESSURE PIPE. In the West, Kaiser Steel and Basalt Rock have joined forces to turn out the biggest pipe yet.

EYES ON THE WEST THIS MONTH. This is "back-to-work" month, and the Pacific Coast Gas Assn. as usual is the bellwether. The association's 56th annual convention comes to order in Santa Barbara, Calif., Sept. 7.

HOUSEHEATING OUTLOOK BRIGHTENS. AGA has released a survey as a followup to the study prepared under the aegis of GAMA last year, showing installation restrictions to be eased in spots although still widespread. At least two major utilities, however, have opened their lines to new installations.

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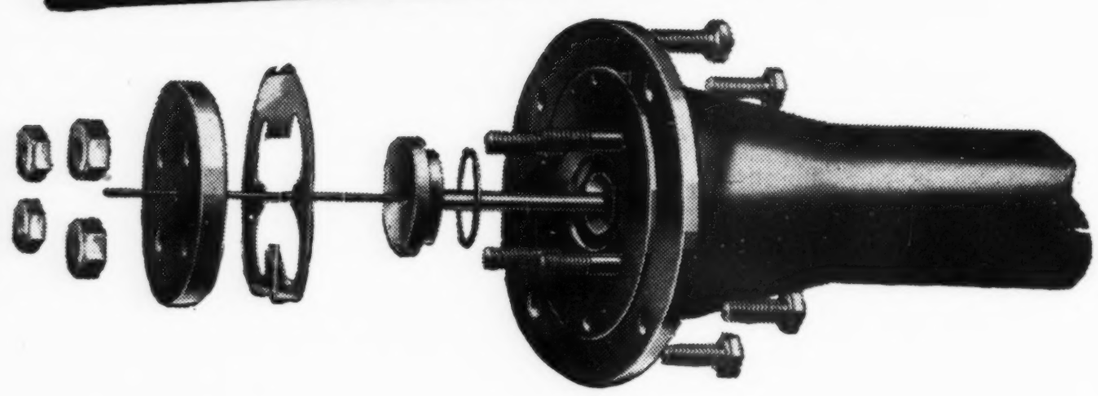

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THERMALLY THINKING

By EDWARD TITUS

new york jurisdiction

THE MOST INTERESTING RECENT DEVELOPMENT in the continuing argument as to how far the jurisdiction of the Federal Power Commission extends over what are normally known as local distributing companies is the decision of Presiding Examiner Emery J. Woodall in the matters of Consolidated Edison Co. of New York, The Brooklyn Union Gas Co. and Kings County Lighting Co.

Examiner Woodall has found that the commission will have no jurisdiction over these companies when they begin to receive natural gas. At the time this is being written in Washington, D. C., the decision awaits review by the commission and possibly by the courts.

How does this tie in with the theoretical contention of FPC counsel in a case involving East Ohio Gas Co. that even a tiny stub line within a state connecting a company with an interstate pipeline, would bring the company under federal jurisdiction?

Even in the present case, involving the New York companies, which long have been under the jurisdiction of the New York State Public Service Commission, the FPC staff attempted to establish that on the completion of the proposed facilities (involving use of natural gas) and operation thereof, each of the applicants "will be engaged in the transportation of natural gas in interstate commerce and will be natural gas companies within the meaning of the Natural Gas Act" (and therefore under the jurisdiction of the Washington authorities).

The staff appeared to hold that since Consolidated Edison and Brooklyn Union were transporting gas to be used not only by themselves but also by other companies in the area, this fact would tend to bring them under federal jurisdiction.

This was despite the fact that the gas will be taken from the interstate company, Transcontinental Gas Pipe Line Corp., at 132nd Street, Manhattan, within New York state, and that all movement of the gas taken by ConEd and the other companies after that would be within New York state.

Examiner Woodall, however, upheld the contention of the companies that they will not become natural gas companies within the meaning of the Natural Gas Act, and that they are not subject to the commission jurisdiction.

Mr. Woodall pointed out that the facts in these proceedings have never been paralleled in any known case before the commission or any court.

where does "interstate" end?

The New York companies on November 3 last year entered into a "New York Facilities Agreement." This was to provide for construction, operation and maintenance of the necessary facilities for distribution of gas delivered to each buyer by Transcontinental, and for the apportioning of costs among themselves.

Each company agreed to construct, maintain, and operate the portion of the facilities within its own franchise territory.

The object of the facilities will be to provide a single pipeline system, rather than five separate pipelines from 132nd Street, to the respective plants and takeoff points of the companies. In this way they will avoid multiplication of the legal and franchise complications and costs of construction, maintenance and operation.

Brooklyn Union's engineer of manufacture testified that if his company were required to construct, maintain and operate its own independent main from 132nd Street to its plants and takeoff points, it would re-examine the whole question of taking natural gas.

The decision says that the legal arrangements do not support the contention that any of the companies will have entered into the transportation of natural gas for others. The decision says also that even if transportation of natural gas by these companies, as distinguished from movement as part of local distribution operations, could be found, one look at the definition of "interstate commerce" which Congress prescribed in the Act negatives the finding that any of these companies will be "engaged in the transportation of natural gas in interstate commerce." The movement is all within one state. The examiner concludes that the interstate journey will legally terminate at the city gate at 132nd Street.

Among the findings and conclusions of the examiner are the following (in brief):

In their gas business, each of the companies is engaged solely in local distribution of artificial gas for consumptive use, and will continue to be engaged solely in local distribution for consumptive use of

natural gas.

Any inter-company exchanges or sales of mixed gas by the use of interconnections (originally created for emergencies), will not constitute the sale of natural gas in interstate commerce for resale for ultimate consumption, but would constitute "other sales," which are expressly exempted from the provisions of the Natural Gas Act.

None of the applicants are natural gas companies within the meaning of the Act.

This examiner's decision, if it stands up before the commission and the courts, will clarify the status of the New York companies involved.

There are certain special angles, however, about the New York situation. And one cannot but wonder what the decision would have been with other companies in which some but not all of the facts were the same. Even in the New York picture the FPC staff thought the companies should come under FPC control, but the examiner ruled differently.

Courts and Congress will decide in the long run. Meanwhile, the battle goes on.

panhandle case

As pointed out by Wesley E. Disney, general counsel to the Independent Natural Gas Association of America, it would be unwise to go overboard in saying that confusion and doubts as to the jurisdiction of the Federal Power Commission under the Natural Gas Act had been cleared up by the Supreme Court decision in the case of the Federal Power Commission against Panhandle Eastern Pipe Line Co., et al.

To review what happened: The Supreme Court ruled that under the Natural Gas Act the FPC does not have jurisdiction over transfer of undeveloped leases by a pipeline company, although the company is otherwise under the statute. Panhandle was seeking to distribute 810,000 shares of its subsidiary company, Hugoton Production Co., to its own stockholders. In this way Panhandle would be divorcing itself from control of Hugoton. At the same time the production company would be free from FPC jurisdictional control. The FPC sought an injunction to prevent distribution of the shares. The injunction was denied by two lower courts and finally by the Supreme Court. So Panhandle mailed out to stockholders the certificates representing shares of stock of its subsidiary, which holds 96,000 acres of gas reserves in Kansas.

The ruling in the Panhandle case concerned one specific situation: undeveloped leases. But what would the ruling have been if production had been going on in the properties involved?

Despite some expressions of opinion, the decision did not settle the problems involved in pending natural gas legislation. The Harris bill, which passed the House, and the one approved by the Commerce Committee in the Senate deal only with *independent* producers facing the threat of assumption of jurisdiction by the commission. On the other hand, the Panhandle case dealt with production and gathering facilities of a company which is admittedly a natural gas company subject to FPC jurisdiction.

Some still believe that the Panhandle decision over-ruled the well-known Interstate case. But Mr. Disney points out that the implications of the two cases differ.

In the Interstate case, there was involved the power of the commission to fix the price at which Interstate (a natural gas company) sold gas to three other interstate pipeline companies (one affiliated with Interstate) for resale by these other companies in interstate commerce.

In the Panhandle case the court specifically reasserted that the commission could examine the cost of production and gathering of a natural gas company in order "to fix just and reasonable rates for transportation and sale of natural gas in interstate commerce for resale." But the court pointed out that "the use of such data for rate making is not a precedent for regulation of any part of production or marketing."

by a good margin

Turning for a moment to the Harris bill, mentioned above, which would clean up part of the mess by definitely exempting independent production and gathering, it is of interest to note that it passed the House by a nice majority of 183 to 131, despite the opposition of certain labor groups and other potent forces who it was once believed would be powerful enough to push about anything they wanted through the present Congress.

The bill is similar to the Kerr-Thomas bill, approved by the Senate Commerce Committee. It is believed at this writing that if the Kerr-Thomas bill reaches a vote in the Senate it will pass. The two are so close together in essentials that the chances are it would not take long to eliminate the small differences in conference. At this writing, in the Senate the problem is that there is much legislation due to come up ahead of it.

But whenever it adjourns, this same Congress will reconvene early next year, and look for action then.

opa parallel

Sen. Edwin C. Johnson (D.-Colo.), chairman of the Senate Committee on Interstate and Foreign Commerce, can wax eloquent at times. One might mention a few paragraphs in particular in the letter he wrote to Acting Director Elmer B. Staats of the Bureau of the Budget, after Mr. Staats had written to indicate the President's opposition to the Kerr-Thomas Bill:

"We repealed OPA since it is contrary to the free-enterprise system. We still have limited controls on domestic rental properties, and these are practically the only controls remaining. Beyond that we do not go.

"But a bare majority in the Federal Power Commission is now attempting to impose a new OPA on the independent gatherer and producer. No such controls are imposed on oil or coal or any other product. In what particular does the gas industry differ from the coal and petroleum industry, which requires this singular and arbitrary action? Needless to say it distresses me greatly to learn that the bureau reports the President does not now agree with this committee on this legislation. If he is opposed, even at this late date, I would like very much to know why, since you told Congress a year ago he favored it. . ."

The Kerr-Thomas Bill, Senator Johnson declared, would carry out the intent of Congress when the Natural Gas Act was passed 11 years ago.

anniversary

During August the anniversary of the success of the pioneer oil well in Pennsylvania, which led the way for the present oil and gas industry, has been celebrated.

This original enterprise, laughed at before it succeeded, was the result of the frank attempt of a group of bold men to get together and make some money for themselves.

It is worth while these days to wonder how much this start of the oil and related industries, and their subsequent progress, would have been retarded if it had been less respectable in those days to take a chance with brains, money and muscle, in the hope of making a profit.

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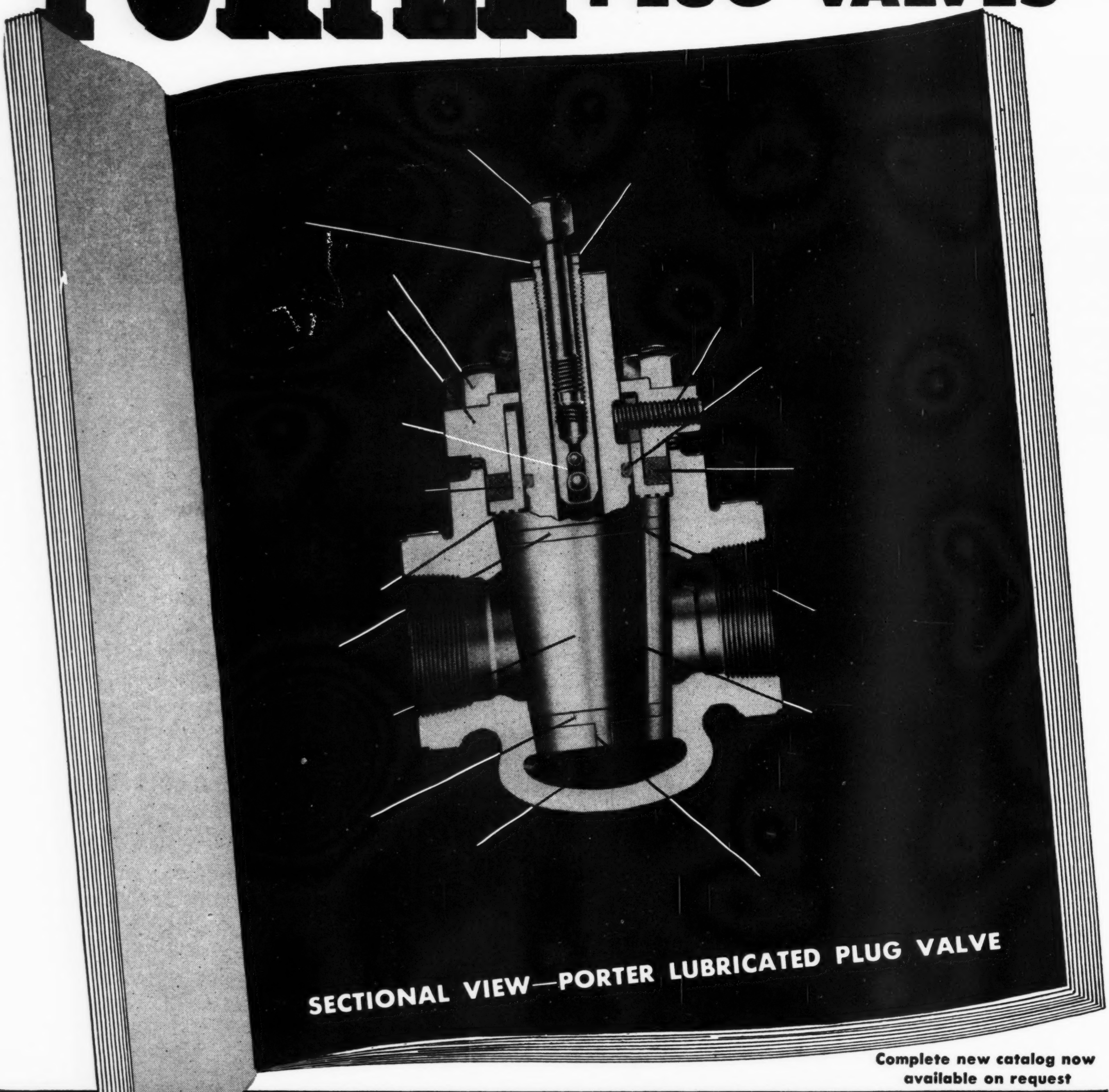

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TECHNICAL TRENDS

by Guy Corfield

Canadian Northwest Oil and Gas

As PACIFIC COAST GAS ASSN. delegates meet at their annual convention in Santa Barbara early this month, those from the northern areas particularly are keenly conscious of the potentialities of the gas and oil fields developing in the Canadian Northwest along the east edge of the Rocky Mountains in the Province of Alberta. The immediate interest is the possibility of natural gas lines to supply Vancouver, Seattle, Spokane, Tacoma, Portland and surrounding territory, which lines would go far to solving the present perplexing fuel problems of this region.

This development, however, would seem to warrant much more widespread interest as it may, either in itself or by encouraging still more extensive exploration, control the future fuel destiny of not only the Western region but the entire American continent and perhaps the Western Hemisphere. It is already being stated by some petroleum geologists that the potential oil-bearing area in Northwestern Canada is greater than Texas, Kansas, Oklahoma, Louisiana and California combined—and there is good possibility that petroleum may exist along the entire east slope of the Continental Divide from Alaska to the Gulf of Mexico. The southern end is already proved and advancing out into the waters of the Gulf. The discoveries in Alberta, and more recently at Point Barrow (the northernmost tip of Alaska), seem to be fixing the northern reaches.

Returning to the present Canadian development: In the Province of Alberta, in the general area around Edmonton and southward, the vastness of the region can be realized by considering that Edmonton is about 300 miles north of the Canadian-United States boundary, and that it is another 500 miles to the northern edge of Alberta, another 700 miles to the Canadian edge of the Arctic Ocean, and still 500 miles more to Point Barrow, Alaska. Scattered minor petroleum discoveries have been made in this great northern region over past years. This writer recalls being in Edmonton in 1921 during an attempted oil boom based somewhat vaguely on the Athabaska-Peace River areas to the north. Little did they know then that the sensational Leduc and Redwater oil and gas fields were at the edge of the city.

The present situation is exciting and, probably from any point of view, rather confused. The Canadians will have to go through all the stages of financing, exploration, development, proration and conservation that are now a familiar story in the United States. The Imperial Oil Co. has announced plans to construct an oil line from Alberta to a point on the Great Lakes from which tankers can take it to Eastern markets. Several proposals have been made for a West Coast natural gas line, the latest being to bring the line through the Canadian Rockies to Vancouver, British Columbia, and then southward through Seattle and Portland and into northern California. Financial and technical problems do not seem to be as great as the international complications and the present sentiment against export of a natural resource.

Foreign investors and operators will no doubt receive fair but firm treatment from the Canadian authorities. The Alberta legislature has already (last July) passed the Gas Resources Preservation Act to control natural gas. This act gives the Petroleum and Natural Gas Conservation Board wide powers in regulating activities of natural gas pipeline companies operating in the area; and prohibits export without a permit which will only be granted after exhaustive examination of applicants' proposed operations; and will grant permits only on condition that the export pipeline companies may be required to supply gas at reasonable rates to any community or consumer in Alberta which wants the service and is in reasonable proximity to the pipeline. The legislator also amended the Provincial Oil and Gas Resources Conservation Act to allow the conservation board to fix and prorate oil and gas production, to declare any pipeline a common carrier, and to prohibit manufacture of carbon black.

Krypton and Xenon

KRYPTON AND XENON are rare atmospheric gases, the former occurring in a concentration of about one part in a million, and the latter one part in 12 million. They are both heavy gases, having atomic weights of 83.7 and 131.3 respectively and are (in common with the other better known rare gases, helium, neon and argon) absolutely inert and therefore potentially valuable for applications where complete resistance to combination with other elements is important or essential, and electrical and physical properties are appropriate.

Linde Air Products Co. has recently announced that it is now producing these two gases in commercial quantities, at the approximate price of $7 per liter (128 cu ft) for krypton and $30 per liter for xenon, in small cylinders. Heretofore production of krypton and xenon has been on a very small scale, but Linde is convinced that new uses and markets will be developed and has therefore embarked on this commercial venture.

Krypton is finding an increasing use as the gas filler for hot cathode fluorescent lamps, for which it is assertedly superior to argon. It is also used in miners' cap lamps and other miniature lamps, where great brilliance is desired. Xenon has replaced mercury vapor in certain thyratrons in the vacuum-tube or communications industry, and in the specialty field it is essential in the gas discharge photograph speed lamp because of its low electrical resistance and spectral characteristics.

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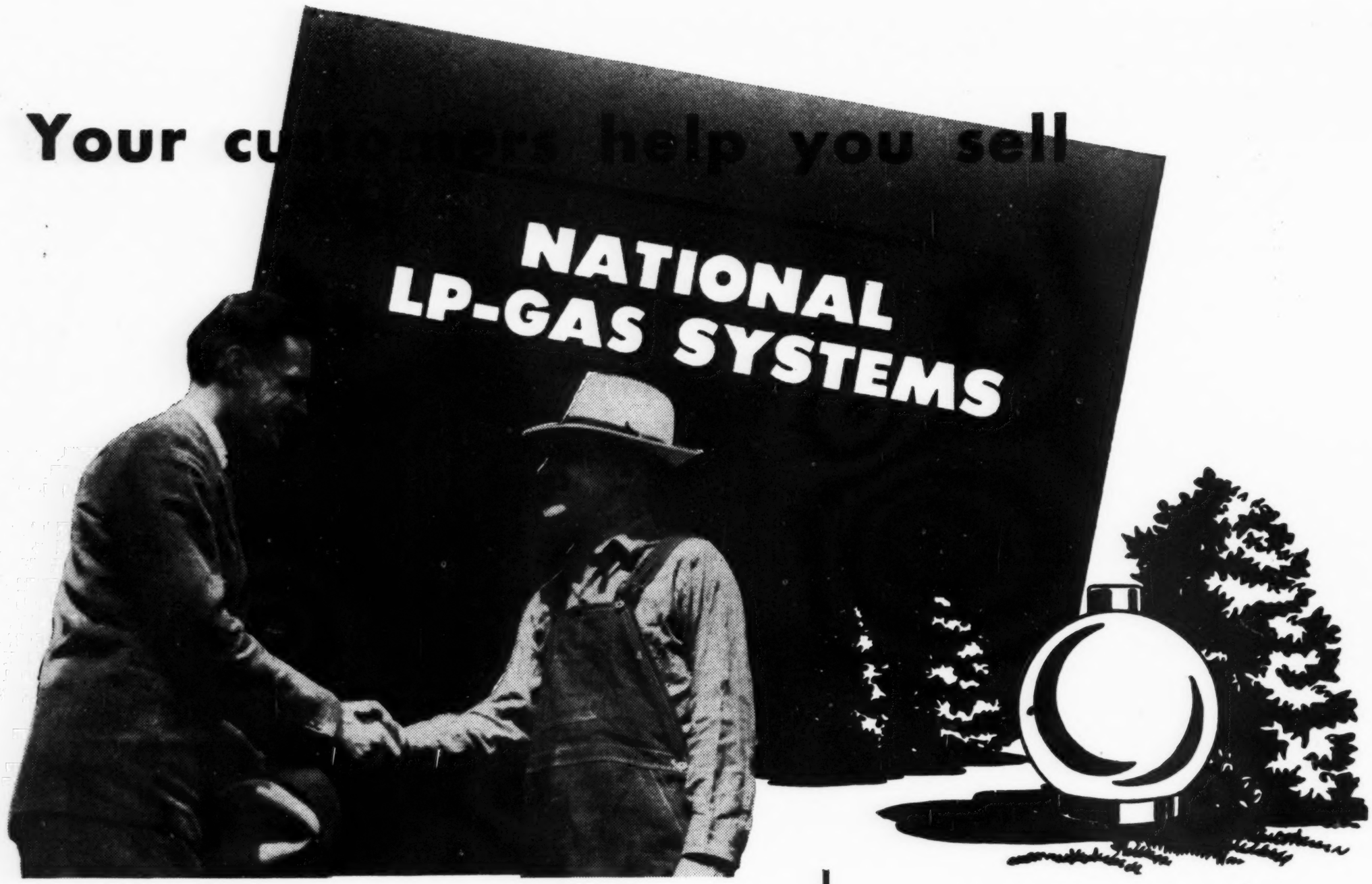

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UNITED STATES STEEL

PROMOTIONAL NOTES AND NOTIONS

by Stanley Jenks

Electric Cooking Challenge

IN APRIL of this year, Leonard C. Truesdell, Hotpoint's "Veep," made a startling statement. He said that, for the first time in history, shipments of electric ranges, during December, 1948, exceeded those of gas ranges. Note, he used the word "shipments," not "sales." There is a subtle but significant difference, which, however, may or may not mean much in this instance. December, in the gas range manufacturing field, is normally a low shipment month, devoted primarily to year-end inventory adjustments, because the Christmas volume was covered in October and November, and the appliance business at the retail level is usually pretty slow in January and February.

Therefore, even though the electric boys might have been high-pressuring their inventory on their hapless dealers (perish the thought!), Mr. Truesdell's startling statement is only serious to the extent that, under any circumstances whatsoever, it shouldn't have happened anyway, with our many advantages.

But when Mr. Truesdell starts gazing into his crystal ball and predicts electrical cooking will outsell competitive fuels within five years, it's time to wonder what was in the crystal ball.

Or—again perish the thought!—does he really think we are so promotionally prostrate as that?

Methinks somebody's going to get his ears pinned back.

Competitors' Shoddiness

A FEW WEEKS before Mr. Truesdell startled us, C. George Segeler, AGA staff utilization engineer, had presented a very interesting and important paper at the New England Gas Assn. annual meeting in Boston. The theme was that unfair electric competitive practices be curbed and curtailed, especially in the cooking and automatic water heating fields, by nailing down these flagrant violations of business ethics right at the executive source and then every inch along the line into the customer's home. True to form, George Segeler proved his case beyond any doubt that some of our electrical competitors are rather prone to exaggeration and somewhat inclined to misrepresent.

"The two most unwarranted claims relate to meat shrinkage and to relative efficiency," stated Mr. Segeler. Forthrightly, he proceeded to prove how unwarranted both these claims are.

Segeler's paper appeared in the May issue of *GAS*, so it got industry-wide coverage. However, it belongs in the hands of every gas range salesman, either utility or dealer. Are reprints available? It should be read and thoroughly discussed at sales meetings. Although addressed primarily to a New England audience, it would take little change to localize it anywhere.

The point is, this electrical misrepresentation must be met head on and its shoddiness exposed at the local level. Of course, the answer is intelligent and intensive sales effort. Gas has got it. Have we too?

Heating Efficiency

THESE NOTES ARE WRITTEN during a heat wave and without the blessings of a cooling unit. But soon the icy hand of winter will be gripping us and we in the fuel business will be very much on the job.

Our only considerable automatic fuel competitor is the oil burner dealer. Right now, he is getting the works to step up the efficiency of his installations to remain competitive with natural gas. No longer, say they, must an oil burner dealer be content with a 70% efficiency in his installations. A little more attention to details when the installation is made, and better servicing practices, will easily raise the thermal efficiency to 85% and at that level it ought to be competitive with natural gas, so they say.

In arriving at this delightfully simple solution to the oil burner dealer's inter-fuel competitive problem, it is also assumed that, while the AGA minimum requirement of approved gas heating equipment calls for 70% efficiency, often the results are less, they say, because of faulty installation.

What this really amounts to is this: Sloppy installations of gas heating equipment open the door for sales-hungry oil competitors. They profit by our mistakes.

Sales Technique

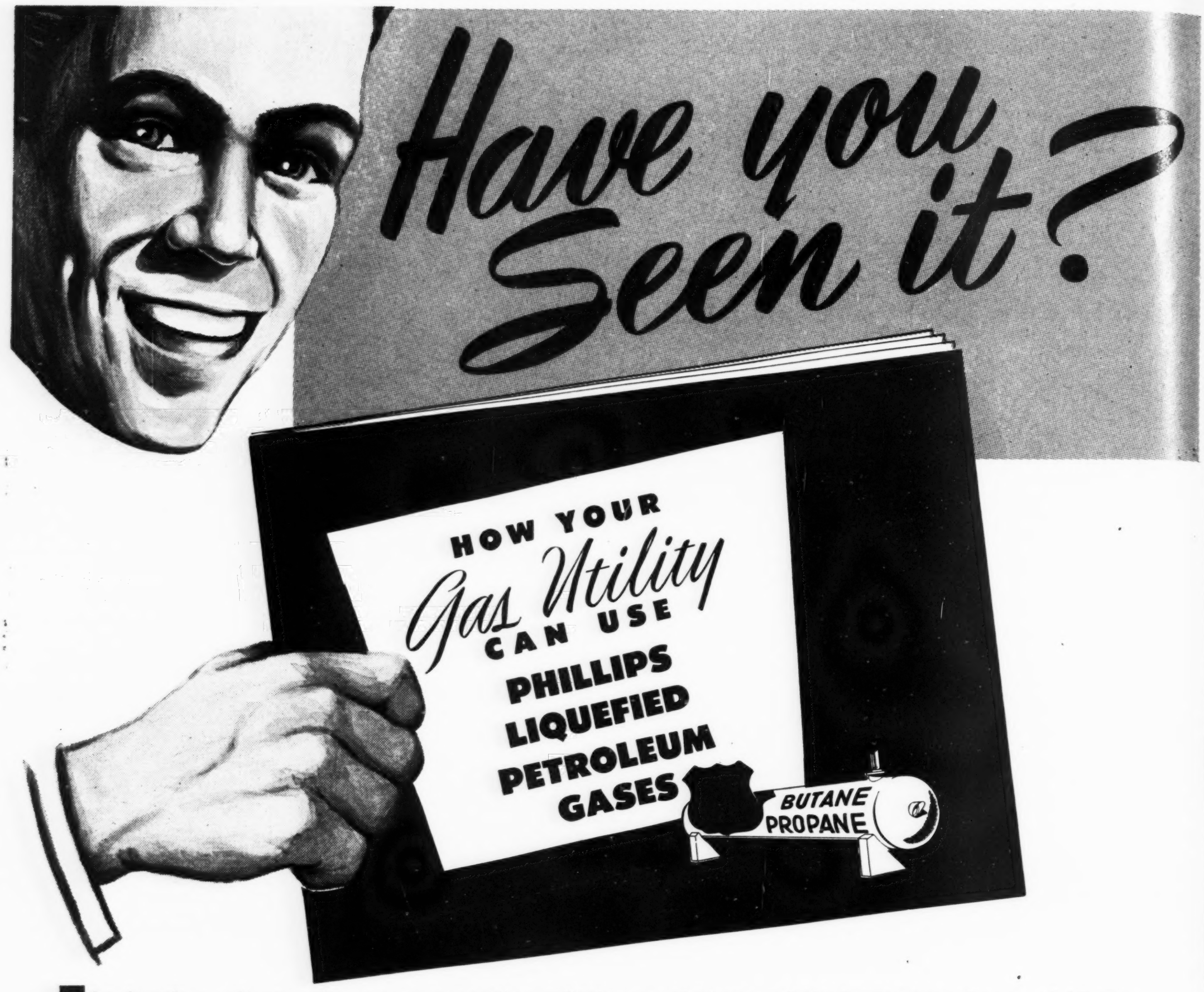
A PURCHASING AGENT friend of mine tells me he never suspected there were in existence so many vice presidents-in-charge-of-sales and general sales managers until he had them calling on him these last few weeks.

Of course, it's no secret that business is looking for business, and sales ability is once again coming into its own.

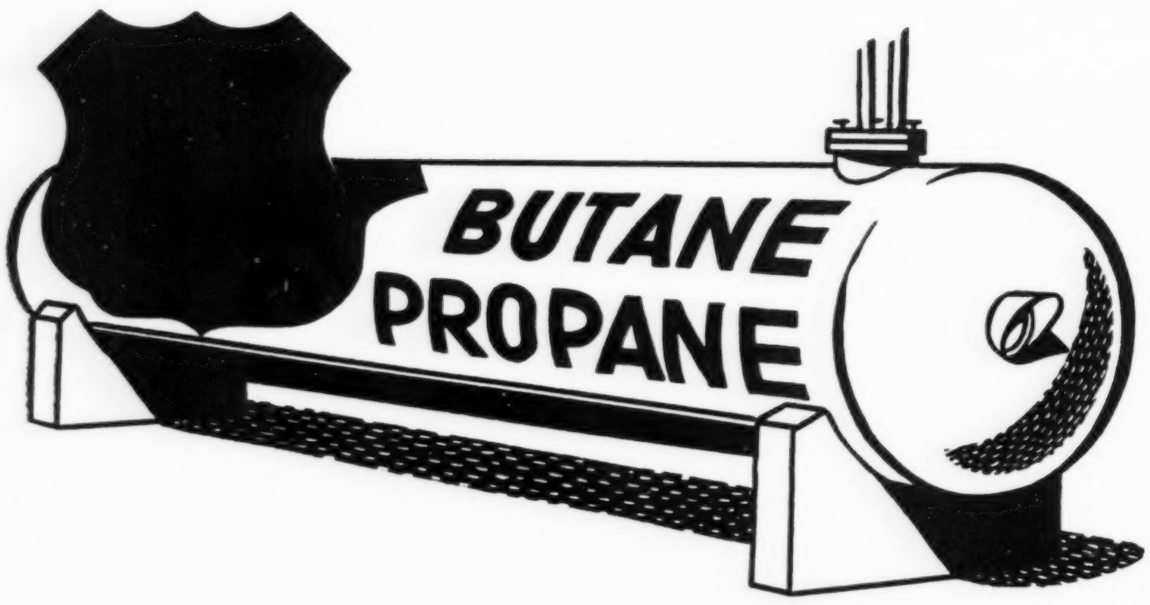
The farsighted policy of many utilities in anticipating this situation by going into intensive sales training courses, as suggested by AGA, is now going to pay off.

Those of us who have sold, and handled salesmen, know that there is a technique in modern salesmanship involving more than a likable personality and gift of gab. Personality and fluency are desirable assets in any would-be salesman, but knowledge of the product and *appreciation of the problem* are equally essential, if not more so. An intelligent man works far more intensively when he knows why he is working.

Even a brief discussion like this of a good salesman's qualifications cannot omit the most essential characteristic of all—guts [*G*ives *U*mpteen *T*alks (sales) *S*teadily]. It takes real courage to pound pavements and ring doorbells day after day, week in and week out. It's no job for the craven, and it can be anticipated that, in a newly organized sales department, there'll be some who will fall by the wayside because they perhaps had everything else but guts.



The brochure shown above was recently mailed to remind you of six important phases of LP-Gas utilization. Its brief but informative contents may be the answer to your "thinking stage" plans for expansion. Whether your utility serves a city of a million or a town of less than a thousand, it will pay you to investigate the efficiency of Phillips LP-Gases. The subjects covered are as follows:



1. **Replacing Manufactured Gas with Propane-air or Installation of New Propane-air Facilities.**
2. **New undiluted Propane Service for Smaller Towns.**
3. **Increased Gas Sendout Using Present Facilities.**
4. **Enrichment of Manufactured Gas.**
5. **Emergency Standby Facilities for Manufactured or Natural Gas Utilities.**
6. **Underfiring of Coke Ovens.**

Additional information concerning the use of LP-Gas by utilities is also available in bulletin form. You are cordially invited to request this literature through the Phillips District Office located nearest you.

PHILLIPS PETROLEUM COMPANY

Philgas Division • SALES DEPARTMENT • Bartlesville, Oklahoma

DISTRICT OFFICES IN AMARILLO, TEX., ATLANTA, GA., CHICAGO, ILL., DENVER, COLO., DES MOINES, IA., DETROIT, MICH., INDIANAPOLIS, IND., JACKSON, MISS., KANSAS CITY, MO., MILWAUKEE, WISC., MINNEAPOLIS, MINN., NEW YORK, N. Y. RALEIGH, N. C., ST. LOUIS, MO., TULSA, OKLA., WICHITA, KAN.

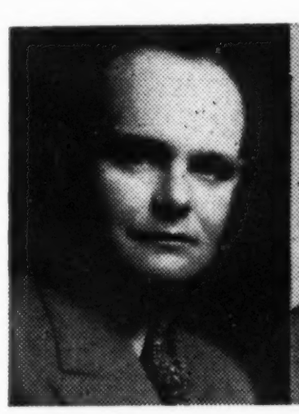
PCGA Takes Over West Coast Resort for 56th Annual Meet

N. HENRY GELLERT
President

E. G. LAWSON
Vice President

D. G. MARTIN
Treasurer

A. E. ENGLEBRIGHT
Director



C. P. DE JONGE
Director

T. T. ARDEN
Director

R. T. RICHARD
Director

A special treat is in store for conventioneers on pp. 48-49 of this issue.

INDULGING in a gracious mixture of business and pleasure that's symbolic of the winding up of the vacation period and the start of another year of peak load and other worries peculiar to the industry, members of the Pacific Coast Gas Assn. kick off the convention season with their 56th annual meeting at Santa Barbara this month. The dates, Sept. 7-9, will catch many on the rebound from the long Labor Day weekend, giving a pleasant stretch to the summer's last fling.

Program emphasis this year has been narrowed pretty much to four general topics: the ubiquitous problem of peak loads; the inescapable fact that the buyer's market is here, at least in the majority of goods; business management and finance; and industrial relations. A glance at the agenda, appearing in brief below, will show how extensively each of these topics will be explored.

In the line of holidaying, members will have an opportunity to get friendly at the Friendship Hour and take a whirl at the dance during the traditional President's Ball. The time-honored golf tournament, always a convention closer, will draw the late-stayers to the links on Friday afternoon. A tea and bridge luncheon have been arranged for the ladies.

Delegates will be scattered all over town, taking over no less than 14 hotels and motels. All business meetings, however, will be held at a single location, the Lobero theater.

Bridge Bows Out

Election of officers will place N. Henry Gellert, president, Seattle Gas Co., at the helm for the next year, succeeding Arthur F. Bridge, president, Southern Counties Gas Co., Los Angeles. E. G. Lawson, president, Pacific Public Service Co., San Francisco, will replace Mr. Gellert as vice president, and D. G. Martin, general auditor, Pacific Gas & Electric Co., San Francisco, will be retained once again as treasurer.

Vacancies in directorships will be filled by T. T. Arden, vice president, Grayson Controls Div., Robertshaw-Fulton Controls Co.; C. P. De Jonge, gas department superintendent at San Diego Gas & Electric Co.; A. E. Englebright, vice president, Honolulu Gas Co.; and Roy T. Richards, assistant general superintendent, Central Arizona Light & Power, Phoenix.

Section Chairman

Within the sections of the association, four new chairmen will be elected, and in the manufacturing section, five divisional chairmen and vice chairmen are on the ballot.

John E. Wolfe, assistant treasurer, Pacific Public Service Co., will head the accounting wing; C. A. Gabriel, Monarch Heating Co., Los Angeles, will return to his top spot among the manufacturers (seconded by T. T. Arden); Jack L. Hall, Southern California Gas Co., Los Angeles, will chairman the sales and advertising section; and R. W.

(Continued on p. 92)

WEDNESDAY, SEPT. 7

REGISTRATION

MANUFACTURERS SECTION LUNCHEON-MEETING
Report of General Chairman
Report of Nominating Committee
"The Year's Work in GAMA"
Harold Massey, asst. mng. director

GENERAL SESSION—2 p.m.
President's Address
A. F. Bridge
Reports of Section Chairmen
Nominating Committee Report
Amendment of By-Laws
The American Gas Assn.
Robert W. Hendee
Gas Appliance and Equipment Industry
H. Leigh Whitelaw, GAMA.

FRIENDSHIP HOUR—5:30-7:30 p.m.

THURSDAY, SEPT. 8

GENERAL SESSION—9:30 a.m.
"Safety Pays Off"
A. W. Turner, SoCal Gas Co.
"Equating Gas Supply and Customer Needs"
1. Gas Supply & Peak Load Requirements
J. S. Moulton, PG&E
2. Eastern Practices & Plans
E. L. Hall, AGA Lab
3. California Practices & Plans
William Moeller, SoCal Gas Co.
"Buyers Market and Our Competition"
1. F. M. Banks, SoCal Gas Co.
2. O. R. Doerr, PG&E
3. W. H. Tappan, Tappan Stove Co.

LUNCHEON—12:15
"What About Russia"
Lt. Gen. Ira C. Eaker

GENERAL SESSION—2 p.m.
"In Balance" (a movie)
"Our Rising Welfare State"
Dr. Emerson P. Schmidt
U. S. Chamber of Commerce
"Business Management in a Changing Economy"
Louis Ruthenburg, Servel
"New Money & Our Expanding Facilities"
Eugene Bashore, Blyth & Co.

PRESIDENT'S BALL—9 p.m. to midnight

FRIDAY, SEPT. 9

GENERAL SESSION—9:30 a.m.
"A Letter From America" (movie)
"Employee Relations at Weirton Steel Is Good Business"
G. T. Fonda, Weirton Steel
"Measuring Employee Attitudes & Information"
L. E. Purvis, Opinion Research
"The Area Within Which the Industrial Relations Man Must Operate"
G. O. Bahrs, attorney
Report of Awards Committee
Installation of Officers.

The allocation of uninterrupted channels to utilities and the discovery of new jobs that mobile radio can do are sparking the growth of this modern communications medium. Herewith are two stories enumerating and detailing some of the uses of mobile radiotelephone.

I. EVALUATION OF SYSTEMS FOR UTILITY USE

By R. E. KOLO

MOBILE radiotelephone is a useful tool in the daily operations of power utilities. In the face of publicity it seems unnecessary to restate the value of the mobile radiotelephone in the conduct of your business. However, it may be worthwhile to list a few of the important usages. Some of the points made in support of the need for mobile radiotelephone are as follows:

1. Protect life and property and speed up the restoration of service to industrial areas that might be affected by interruptions of their power source.
2. Dispatch repair and construction crews when and where needed.
3. Report "on the spot" information to dispatcher after crew has reached the location of trouble and secure assistance when needed.
4. Enable crews and repairmen to call dispatcher promptly regarding new assignments.
5. Coordinate the work of several crews when engaged in patrolling and checking long sections of line in order to find or isolate the trouble, to reroute lines to furnish service to the point of break and to maintain service over other routes.
6. Coordinate the work of construction crews during stringing and sagging operations.
7. Redirect equipment and supplies in transit and expedite the ordering of additional equipment and supplies.
8. Keep key people in personal touch with activities during emergency situations.
9. Enable supervisors, foremen, and inspectors to make and receive calls in their cars instead of driving to the nearest telephone.
10. Dispatch investigator to scene of accident to obtain information on cause of accident.
11. Save time and loss to customers in getting repairs under way by contacting repairmen en route in nearby vicinity of trouble locations.

The telephone company offers two types of radiotelephone service for your consideration. A private system, engineered to suit your special purposes, is available. The common carrier system is also available and may be used to good advantage as later described.

The common carrier services are divided into three types. The general service contemplates the full use of your normal telephone facilities. *Fig. 1* illustrates the arrangements. For those making a large number of calls from fixed locations, such as a load control point, a service known as dispatching service is offered. A telephone directly connected to the radiotelephone operating position is provided. This service features a lowered cost and a somewhat faster speed per call.

There is also offered a signalling only service wherein a receiver only is installed in the vehicle. Calls directed to this vehicle ring a bell and light a signal lamp to advise the driver to proceed according to prearranged plans. This type of service may be useful in areas where the range of the land station greatly exceeds that of the mobile station.

Private systems are the type generally considered in most of your trade papers. Widespread publicity has been given them in connection with representations before the Federal Communications Commission regarding frequency allocations. Many have assumed that private systems offer the best arrangement for the power utilities possibly because it was feared that the service could not be reserved as required during emergency.

For small companies this sort of arrangement is practicable inasmuch as the load on the channel is moderate and the control can be made effective. However, where the loads are large or operations are widespread the use of the private system has limitations.

Advantages of Common Carrier

The common carrier system of operation offers certain advantages to the power utilities in the latter case. This service is designed on the basis of serving the general public and as such is connected in with the general telephone network. This in itself is a very important advantage in that the least limitations are placed upon your personnel in reaching your radio equipped vehicles. Management personnel may call field supervisors from home or from the office with equal facility.

The common carrier system in most communities consists of more than one channel in the service of the general public. The mobile units serving the utility can be associated therefore, with more than one channel and in addition to the benefit of the connection to the telephone network there are the greater possibilities of reaching some

(Continued on P. 36)

Mr. Kolo, who is radio engineer for Cincinnati and Suburban Bell Telephone Co., presented this paper in amplified form before the Edison Electric Institute's transmission and distribution committee meeting.

Radiotelephone

II. APPLICATION TO SERVICING

METROPOLITAN customer-service departments, long seeking a quick service truck-to-headquarters communications system, began installing radio-telephones in their trucks about two years ago. Now, after two years' trial, some evaluations of radio-telephone equipment can be made.

Exclusive

Southern California Gas Co. now operates a total of 15 radio-telephone controlled service trucks in the Los Angeles metropolitan area—widely scattered through its various customer-service stations. The company put its first radio truck into service in March, 1947, in Pasadena.

As an emergency device, radio-telephone communication has proved its worth on many occasions. But on a day-to-day service basis, radio-telephone is admittedly more expensive than the old nickel in the telephone coin box.

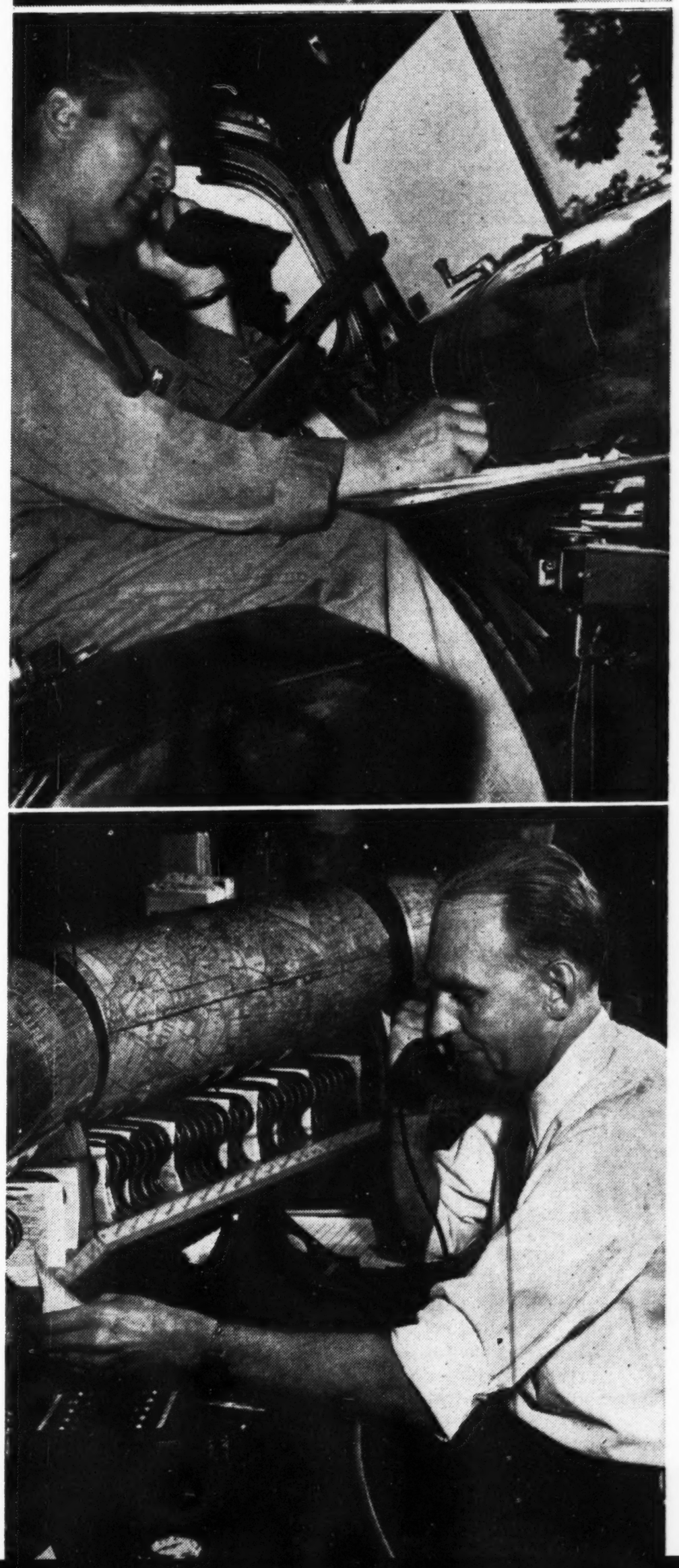
There have been in Los Angeles two urban radio telephone channels, which serve approximately 55 customers each. It's a party-line system carried to the extreme. However, the telephone company voluntarily limits each channel to 55 customers.

The range of radio-telephone—about 50-mile radius from the central broadcasting station—presents no problem to SoCal, since all trucks operate well within the range.

Each radio-telephone-equipped truck is installed with a 20-watt transmitter and regular telephone. When the utility wants a driver, it calls the mobile operator, gives the truck's number, prefixed by special designating letter, and the operator rings the truck. No other party on the line is rung. To answer, the serviceman (who may be driving along the Los Angeles streets at the time), simply parks his truck (an important safety measure), lifts the receiver and speaks. He can ring the home office just as easily—by calling the mobile operator.

Southern California Gas Co. comes under a special "dis-

(Continued on P. 37)



One of the newer radio-telephone setups is shown at top, as installed in a customer-service vehicle. At center, Servicemen A. J. Kelly tunes in the home office while sitting in the cab of his truck, while at bottom is shown the dispatcher's office with which he can communicate speedily at any time.

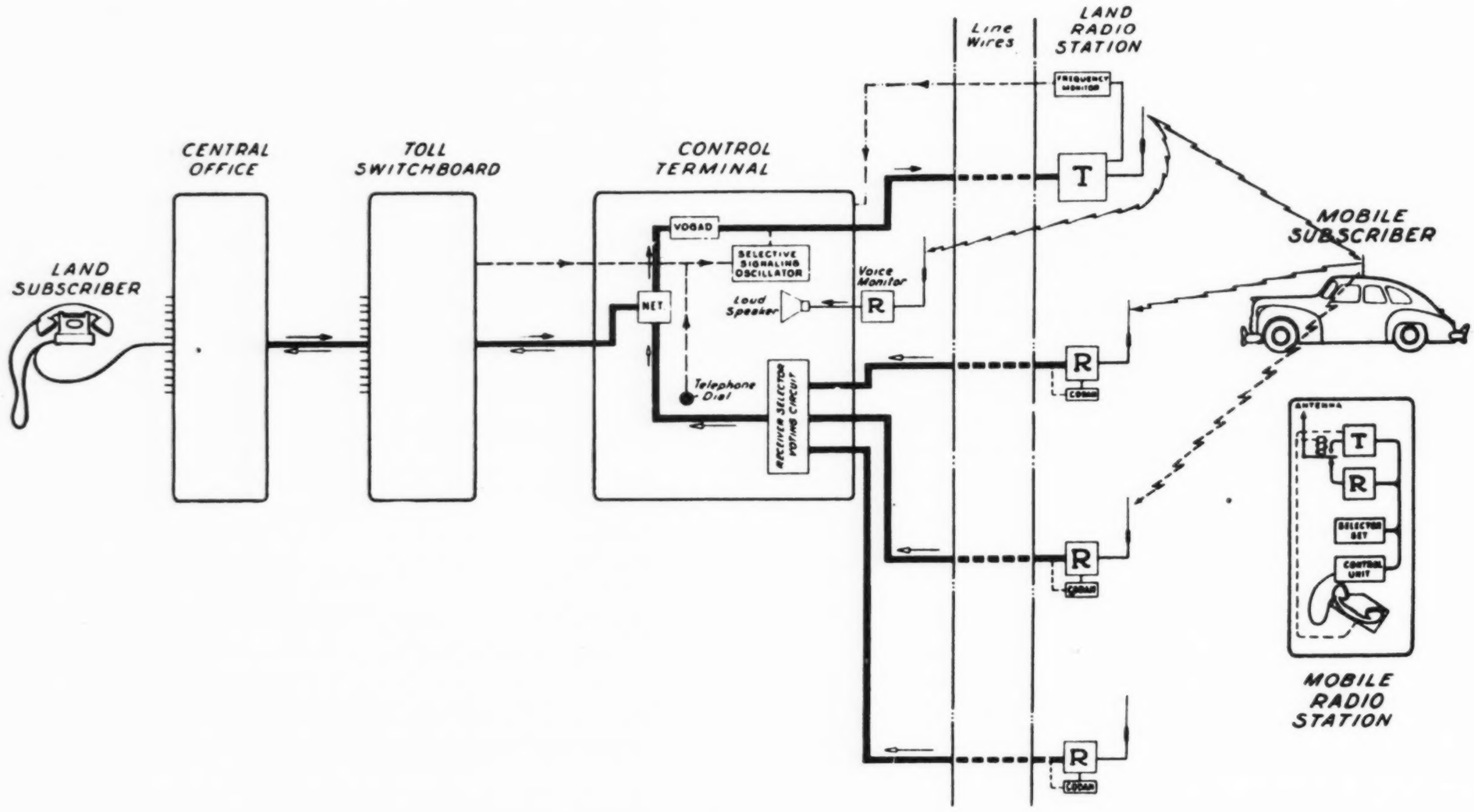


Fig. 1. General mobile radiotelephone system block diagram.

EVALUATION Cont'd

mobile units in the event a channel was found to be busy.

In cities like Cincinnati, where there are now three channels working,[1] and where the fourth will shortly be in service, the advantage may be understood. There are certain other advantages in using the common carrier system when there are several radio stations in this service. The risk of a general outage is lessened since it is unlikely that all channels would fail at the same time.

Being able to secure service as a part of a large pool of facilities is advantageous from the cost angle. The consolidation of control equipment permits the minimum in personnel requirements. Sometimes several are easily maintained by one technical operator. This results in reduced costs per unit and is of course reflected in the rates paid for the service.

Some additional advantages are obtained by leasing radio communication facilities from the telephone company. Because radio communication service for the general public is a large undertaking, groups of technically trained personnel are on duty 24 hours daily throughout the week and the year. Utilities appreciate the advantage gained from having available a large group of radio operators particularly in an emergency.

In the course of our regular operations we have developed our testing and maintenance facilities to a considerable extent. The investment represented is justified by large and widespread operations. Mobile units are brought into the shop, replaced with units from the shelf, and sent on their way with a minimum of delay. Any difficulties in the mobile equipment can then be cleared at the convenience of the technician and placed on the shelf ready for future maintenance visits. In the field of maintenance of the mobile equipment, most companies have a substantial investment in testing instruments.

In order to obtain statistical information regarding the use of services of the telephone company's facilities throughout the United States, surveys were made last September of power, gas and water utilities. In these totals there are a few water and gas companies but the power utilities predominate. In the common carrier service there were 574 mobile units then being served by telephone companies. Three of the largest are listed below:

Central Illinois Light Co.	
Springfield, Illinois	10
Peoria, Illinois	16
Cincinnati Gas and Electric Co.	
Cincinnati, Ohio	28
Union Electric Co.	
St. Louis, Mo.	58

In the private service the setups shown in *Table 1* were furnished by the telephone companies.

These statistics are given to show the extent of the service as then furnished by telephone companies associated with Bell system. It is interesting to note that a number of the REA services also use the common carrier for their radio units. The totals are somewhat larger now, but are not available in detail.

The cost of the services varies somewhat from job to job because of a number of differences. Private systems being tailored to individual requirements have their costs determined from the investment and must necessarily change from time to time. These factors also change somewhat from area

[1]As of last February.

TABLE 1. PRIVATE SERVICE SYSTEMS

	Customers	*Land Stations*	*Mobile Units*
In service	11	12	242
Contracted	15	62	857
Total	26	74	1099
The largest of these are as follows:			
Consumers Power Co. of Michigan		52	767
Philadelphia Electric Co.		2	95
City of Nashville Electric Power Board		1	30
Public Service Co. of Northern Illinois (CP only)		6	65
Northern States Power Co., Minneapolis, Minn.		1	53
Southwest Central REA Indiana County, Pa.		1	5

APPLICATIONS Cont'd

patch rate" on the mobile service. Initial installation of radio-telephone equipment costs $50 per truck. Rental charge is $25 monthly per truck. For each call up to one minute's duration, 15 cents is charged. Thus, a three minute conversation costs 45 cents. This, however, is a special rate. Other users of mobile phones whose usual calls are for longer duration, pay 30 cents for each three-minute call within the normal 10-cent zone. Public utilities and other mobile customers which have many trucks on the same radio circuit get this special dispatch rate.

The dispatch rate also means that instead of the phone company handling the calls through a mobile operator, calls are switched to the company's own mobile switchboard operator.

Toll charges for all of Southern Calif. Gas Co.'s mobile cars are lumped together on one bill—the average per truck phone bill running somewhere between $45 and $55 monthly.

Despite the initial, rental, and operating costs of the mobile units, they have saved money in some ways. Usually the serviceman can make one or two more calls per day, using time saved by not having to leave the truck, or drive blocks to find a pay phone. The company can dispatch the repairman as he drives en route to a job, thus saving time and having manpower available in an emergency. Mobile phones, hooked to the truck's horn, warn servicemen even when they're on the job and away from mobile phones.

A. J. Kelly, a mobile serviceman for Southern California Gas Co., says his phone saves time in remote locations where there are no phones—and even in downtown districts where parking is impossible.

Despite what might seem a temptation to use the mobile telephones, too often, thus running up large bills, Mr. Kelly says he actually makes fewer calls now than on the old nickel system. The reason is that he doesn't have to phone in to report. He knows he can be reached when the home office needs him. Also, phones have taken the pressure off servicemen who, delayed at jobs, were often out of touch with the home office. As long as his phone doesn't ring, he knows he may finish the job before calling the home office.

Mr. Kelly's only objection is finding the line busy—which happens often, but usually not for long. He says that the average service truck-to-home office call is completed in 46 seconds—just a job code number plus address is given.

Mobile phones are good public relations. Once he was within a block of his service job when he was dispatched there, and arrived before the woman had a chance to return from a corner store where she'd placed the call. She was astounded at the company's quick, efficient service. His to-the-job speed has increased more than 50% since the inception of mobile phones.

EVALUATION Cont'd

to area because of differences in labor costs, shipping charges and the like. The common carrier services, however, can be averaged pretty closely.

It is believed that telephone companies can offer important advantages in providing radiotelephone services to power utilities. Specialists in communication, the telephone companies operate large numbers of radio circuits and have available a force of trained technicians. This results in economies of operation and maintenance that are reflected in the rates. Engineering services are also available and the power utility is relieved of the responsibility of supervising the installation.

Solving Problems In Utilization

Warming Water for Car Washing

Introduction. Heated water for car washing is a requirement of practically all garages and a greatly increasing number of service stations. Car washing is a specialized water heating application which requires a steady uniform flow of water at a temperature of approximately 90° F. Water at this temperature will not damage either the natural or the wax finish of a car. Water at higher temperatures injures the finish of the car while cold water will not do a satisfactory cleaning job. Field tests have shown that water at 90° does the thorough cleaning job without damage to the finish of the car. Water at this temperature is easy to work with and enables the operator to wash a car rapidly.

Problem. The washing of cars is often an intermittent operation depending upon day, weather, and season; consequently the maintaining of heated water in a storage tank is costly.

Fire prevention codes relative to the installation of fuel-burning equipment in garages must be complied with and the hazard of fire eliminated. These codes generally require installation either in a fireproof boiler room or at a height of at least 8 ft above the floor.

Solution. These special considerations encountered in car washing led the industrial department of the Milwaukee Gas Light Co. 17 years ago to pioneer an instantaneous heater which would supply water at 90° F and which could be hung on the wall of the garage or service station 8 ft above the floor.

The garage water heater is a simple instantaneous heater consisting of a length of 4-in. boiler tubing within a length of 6-in. boiler tubing. Immersion firing, gas being burned within the inner tube, is used to provide an efficient means of heating the water. The water flows in the annular space between the inner 4-in. tube and the outer 6-in. tube of the heater. This construction provides a large heating surface and takes advantage of the high efficiency which immersion heating provides.

The water temperature is controlled at 90° F by use of a snap acting rod and tube type thermostat, thus providing water at a temperature which will not harm the finish of a car. The rate of water flow is controlled by a special water regulating valve. Flame failure protection is provided with a thermocouple safety pilot. The heater capacity is 170 gal per hour at a temperature rise of 50°. The gas input is 80,000 Btu per hour. Thus heated water is provided by a fully automatic instantaneous heater requiring no storage or standby facilities.

Results. The sale of the car washing equipment to garages has opened the door to the sale of other gas-fired equipment. Applications of gas-fired equipment in garages and service stations are of a wide and diversified nature depending upon the extent of the service rendered by the operators to their customers. The sale and installation of car washing equipment can lead to such other applications as direct-fired unit heaters for space heating, torches for radiator and miscellaneous repair, parts and motor cleaning tanks, steam cleaning systems, and drying ovens for those establishments which include painting and body repairs as a part of their service. There is a definite market for gas load in the garage and filling station which active solicitation can readily obtain.

JACK H. MIKULA
Milwaukee (Wis.) Gas Light Co.

LP-GAS: Proper Equipment and Applied Know

By FRANK M. TAYLOR

LIQUEFIED petroleum gas, properly handled, with adequate equipment, is in many respects safer than any other fuel. The product's natural characteristics, constantly improving equipment developments, and more than 20 years of practical experience in handling this material, are responsible for liquefied petroleum gas occupying this very enviable position in relation to other fuels. Knowledge has produced safety.

The natural characteristics referred to which contribute to the safety of the gases are the reasonably low vapor pressure, the fact that they are nonpoisonous, general freedom from corrosiveness, and very narrow limits of flammability. The latter, of course, is the reason that very seldom does a fire occur when liquefied petroleum gas escapes from its container or delivery medium into the surrounding atmosphere. It also accounts for the fact that this characteristic has been successfully demonstrated by the extinguishment of a lighted match, at the end of a transfer hose, by opening the valve and subjecting the burning match to a stream of LP-Gas. Any such demonstration, however, is pure sensationalism and fosters disrespect —one thing that every person in any way connected with the industry should positively refrain from doing.

As for limits of flammability, there is a very *definite range* of mixtures which will burn or explode. This range lies between the lower and upper limits of flammability. For example, a mixture of propane and air will burn if, in a given volume, the percentage of propane present is not less than 2.3% or greater than 9.5%. As an extreme comparison with other fuel gases: hydrogen, when present in any percentage from 4% to 74%, will form a flammable or explosive mixture. Also, a flammable or explosive mixture will be formed if acetylene is present in air in any percentage from 2% to 80%. The relatively narrow range of limits of flammability of propane is reflected in the safety of LP-Gases as a fuel, because, in case of a leak, the chances of the formation of a flammable mixture are comparatively small.

During the development years of the LP-Gas industry it was to be expected that certain items of equipment such as pressure vessels, valves, pumps, hose, etc., that were perfectly satisfactory for steam, air, or volatile liquid service, and which of necessity had to be adopted for use in the LP-Gas industry, would be found to be in some way inadequate or impractical. The manufacturers of such equipment have done a splendid job in keeping pace with the numerous technological developments and have every reason to be proud of the LP-Gas handling and utilization equipment that is available today, and through which the manufacture, distribution, and utilization of liquefied petroleum gases may be carried on with absolute safety.

Knowledge Needed

In the LP-Gas business, as in any other enterprise, *availability* of the finest and most suitable equipment possible does not alone suffice to accomplish the purpose, but knowledge gained and applied produces safety. Proper analysis of conditions, selection of the equipment capable of performing each particular function, effective assembly and installation, sufficient periodic inspection and servicing, and last but of greatest importance, operation by fully informed, properly trained personnel, are necessary to obtain the optimum in safety. Our combined experiences during the period of twenty some years makes conformity to these conditions entirely possible if our knowledge is exchanged, compared, and disseminated throughout all divisions of the industry.

There is a definite need of more interchange of such beneficial knowledge and a grave necessity of informative facts about LP-Gas reaching the general public, and those performing services incidental to our operations. This is necessary in order to maintain the industry's welfare, because there is considerable adverse public opinion prevalent in some quarters at this time, particularly among a few insurance companies. That this detrimental opinion has reached consequential proportion is evidenced by the following excerpt from a letter dated Dec. 23, 1948.

"There have been several reports in this area concerning an increase in liability insurance rates which vary between 300% and 600%. (Blank) Company's insurance costs were tripled for next year and their coverage is not as complete as it was this year. (Doe) Brothers' insurance rates were supposedly increased 600%."

It is obvious that if this trend in thinking is allowed to go uncontested and steps are not taken to correct the impressions apparent in the minds of some persons, it is likely to cost the concerns engaged in the LP-Gas business untold thousands or perhaps millions of dollars annually. The remark has been heard on occasion that the manufacturers of liquefied petroleum gas are in a category separate and distinct from the distributors, transporters, and dealers who handle, store, and deliver this material to the consumers and, therefore, are not too much concerned with what takes place after the material is loaded into the motor truck cargo tank picking up the material at the manufacturer's loading rack.

It is true that the state of California, Division of Industrial Safety, exempted natural gasoline plants and refineries from the regulations contained in the Liquefied Petroleum Gases Safety Orders, Revised, effective Jan. 1, 1946; but in all probability this was done because a major portion of the orders applies to other than production and refining facilities, and also, because of the Division's Petroleum Safety Orders covering these operations which the division believes are adequate.

Can there be any doubt regarding a probable impact upon the natural gasoline manufacturers and refiners as well as the marketers, should LP-Gas falsely or otherwise, become generally known as an undesirable element or extremely hazardous material? If such were the case, would insurance company engineers be inclined to overlook the reputedly dangerous exposure because of its presence in a gasoline plant instead of an LP-Gas bulk plant? Not very likely! More probably, the surcharge would be greater, gallon for gallon, because the gasoline plant would

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Mr. Taylor is manager of the purchasing, transportation, and insurance departments of Petrolane, Ltd., Long Beach, Calif. This paper was delivered at the March meeting of the California Natural Gasoline Assn.

Can Keep It Safe

embrace a much larger overall risk. But there is no need to make suppositions, or hypothetical examples; the matter is simpler than that. No company can afford to have an accident which might destroy its entire plant.

This brings us to consideration of what our company believes to be the most efficient assembly of equipment to prevent such an occurrence. Referring to a previous statement regarding the limits of flammability reminds us that liquefied petroleum gases will not burn unless they are part of a gas-air mixture containing at least 90.5% air; therefore, if they are stored, transferred, or delivered in a closed system, thus preventing contact with air, no danger of fire or explosion can possibly exist. Our problem then, from the standpoint of safety, is to make sure that no gas-air mixture is allowed.

It is assumed that any refinery or natural gasoline plant handling LP-Gas will have provided proper equipment for the operation, such as pipelines of at least extra-heavy pipe, storage tanks with required working pressures for the products stored, specially seated valves for LP-Gas service (400 lb owg), and all other items necessary to maintain an adequate, closed system in the normal course of operation. Therefore, the only possibility of a hazard is through some abnormal situation. A natural question would be, what abnormal situations?

Abnormal Situations

In handling liquefied petroleum gases we are working with products having entirely different vapor pressures; for instance, at 100°F. butane has a vapor pressure of 37 lb gauge while propane exerts a vapor pressure of 175 lb gauge. For economic reasons, storage tanks are often used that are suitable for one product, or perhaps a mixture, but not suitable for higher vapor pressure material; therefore, care must be taken to insure against delivering a product having a vapor pressure in excess of the working pressure of the tank taking delivery.

Secondly, refineries and natural gasoline plants usually employ positive displacement pumps. For this reason, to prevent the possibility of pressure increases beyond equipment limitations, which might result from unexpected restriction in the system, and cause a rupture, accurate, quick-acting pump controls must be applied.

LP-Gas storage tanks require that from 10% to 13½% of the total capacity of the vessel be left unfilled by liquid as a cushion against expansion. It follows, therefore, that precautionary measures should be exercised to prevent overfilling.

And, of course, to continue along the line of flow, proper provision must be made for the relief of the receiving tank should any condition result in an internal pressure within a tank equal to the tank's safe working pressure.

Surely, complete knowledge about this type of equipment and proper information regarding the characteristics of LP-Gas couldn't result in an unfavorable comparison. That is why it is maintained that probably a true comparison has not been made in some cases and complete knowledge and understanding is lacking in others.

I strongly recommend that each and every person connected with the LP-Gas business carefully scrutinize his operation for the purpose of a true comparison. Make certain that your personnel has complete knowledge and your equipment is adequate for complete safety.

TABLE 1. ANNUAL SALES

Year	Million Gallons	Increase
1928	5,000	
1933	40,000	700% in 5 years
1938	165,000	312% in 5 years
1941	462,000	180% in 3 years
1943	670,000	45% in 2 years
1947	2,209,797	215% in 4 years

Consider for a moment a few figures in connection with the distribution of liquefied petroleum gases. The U. S. Bureau of Mines has compiled statistics on nationwide annual sales of liquefied petroleum gases since 1928, the approximate beginning of the industry. A few of their figures will demonstrate the rate of expansion of our industry. (See *Table 1.*)

The National Fire Protection Assn. is another well recognized authority primarily interested in safety through the prevention of fires. They keep a very close check on the causes of fires through the state fire marshals. In the first few years of the use of LP-Gas as a heating fuel the quantity, compared to other fuels, was quite insignificant and apparently the fires caused in buildings throughout the nation by this fuel were not of sufficient consequence to warrant any special attention. The NFPA had a category captioned "Gas and Appliances," which classification included manufactured, natural, and mixed gases and all appliances for their utilization.

LP-Gases were included in this group for the purpose of recording fire causes.

Our distribution statistics showed that the increase in LP-Gas distribution was very rapid and that during the year 1941, it amounted to 462 million gallons. Referring to NFPA's "Facts About Fire" for the year 1941 we find that "Gas and Appliances" caused 4000 fires in buildings that year. Only four of 28 causes were responsible for a lesser number of fires: sparks from machinery and friction, fireworks, films, and thawing pipes.

By the end of 1947 we had achieved an annual distribution of 2,200,000 gallons, an increase of 400% over 1941. NFPA's report covering causes of fires for that year blame "Gas and Appliances" for 4300 conflagrations, an increase of 7½%. If we give no consideration whatever to the additional fires caused by all other gases and blame LP-Gas for the entire increase, we still have a mighty enviable record and from the standpoint of both the number of fires caused, and the dollar value of losses, liquefied petroleum gas has proven itself to be safer than electricity, oil, coal, wood, or any other class of fuel.

Knowledge given to the consuming public by those engaged in the industry, through well informed sales and service personnel and educational literature, is unquestionably responsible for this outstanding achievement in *general safety;* and management of the refineries and natural gasoline plants should consider it their grave responsibility to make absolutely certain that all personnel connected in any way with LP-Gas operations is sufficiently schooled in the handling of the product to make it a certainty that this excellent record is maintained. If our collective *knowledge* is sufficiently dispersed to all concerned, *safety* in the LP-Gas industry will improve materially and continuously.

Transport Safety

The photographs shown on the following two pages illustrate equipment installations which I believe provide for such contingencies as completely as possible.

But this is not the complete story. There is another phase of the liquefied petroleum industry which vitally concerns the refineries and natural gasoline plants: truck transport loading and unloading. Generally speaking, there is not one plant engaged in the production and marketing of liquefied petroleum gases in the Pacific Coast area that does not ship its products by motor truck transport; in fact, by far the ma-

(Continued on p. 41)

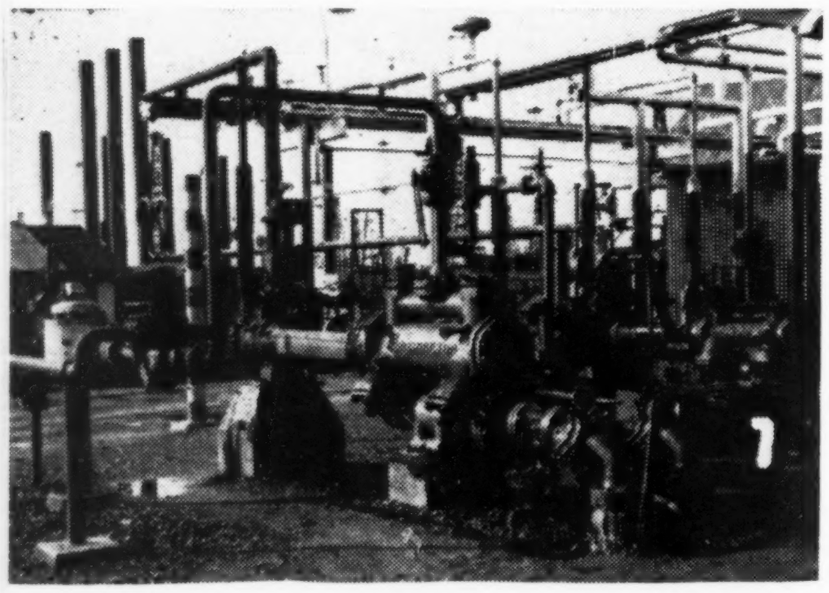
Safe Equipment Installations

Fig. 1 is a general view of the plant showing a battery of pumps. The pump in the foreground is our plant storage-to-bulk plant storage pump, through which our liquefied petroleum gases are handled. In the picture are several devices for accomplishing the type of control desired. Rising out of the ground are two lines, one for propane and one for butane or commercial LP-Gas mixture, each equipped with a blinding flange. Before any shipment is commenced, the spectacle plates are changed as called for and inspected by both the plant operator and the bulk plant gauger. Both men sign a written report as to the position of each plate immediately prior to shipment. Just below the blinding flange is shown a 1-in. valve and line, which connects the pump intake piping (between the two valves) with one of the plant vacuum lines for the purpose of draining this section of the manifold before the blind flange spectacle plates are changed. The vertical line with flanged connection to the top of the pump is the pump discharge line, with a right angle take-off leading to a spring-loaded by-pass valve set for 75 psi differential pressure (difference between pump inlet and pump discharge), which is slightly above the pressure required to move the liquid at the desired rate. The outlet of this valve discharges into the pump suction.

At this point it was deemed advisable to provide a secondary or over-control—not because the relief valve was inadequate in design or capacity but because of the remote possibility that something might occur that would result in insufficient relief to prevent the pump building too high a pressure on the system. Directly above the power end of the pump is shown a Fisher 4100-DR-555 pump governor, with a small line running from the pump discharge manifold to the control head of the governor. The governor is designed to be normally closed, depending upon separate auxiliary pressure on the diaphragm to keep it open, and is set to bleed down and close if the pump outlet pressure reaches 275 psi, thereby stopping the pump by shutting off the steam.

An additional item of equipment that is not visible in the picture is a cast steel, duprene seated, back-flow check valve in the line leading from the pump discharge.

This equipment assures us of an absolutely safe delivery of LP-Gas into the pipeline.



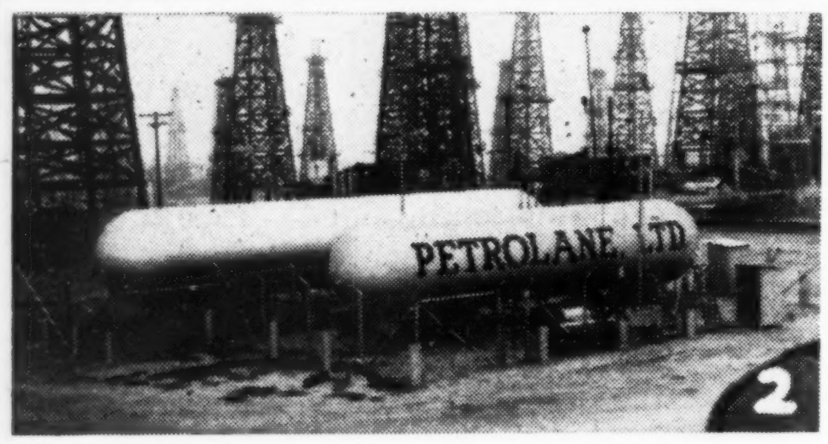


Fig. 2 is a general view of the bulk storage plant from the "receiving" end. The tank on the right is a butane or "commercial butane" unit with a gross capacity of 20,000 gal and has a maximum working pressure of 140 psi in accordance with the API-ASME Code. The tank on the left is a 30,000-gal gross capacity unit with an API-ASME maximum working pressure of 250 psi. Again, in the interest of safety, this storage is remote: approximately 1600 ft from the absorption plant, situated on a spacious plot of ground, not adjacent to any domestic or commercial housing, not on a heavily traveled thoroughfare but convenient to two main east-west highways and two main north-south arteries.

Fig. 3 shows the receiving mechanism detail. Here are "Identical Safety Twins," the one on the left handling butane and the one on the right handling propane. The pipe coming out of the ground in the very center of the picture, equipped with a 400-lb OWG, duprene disc, globe valve is the delivery end of the pipeline from the plant.

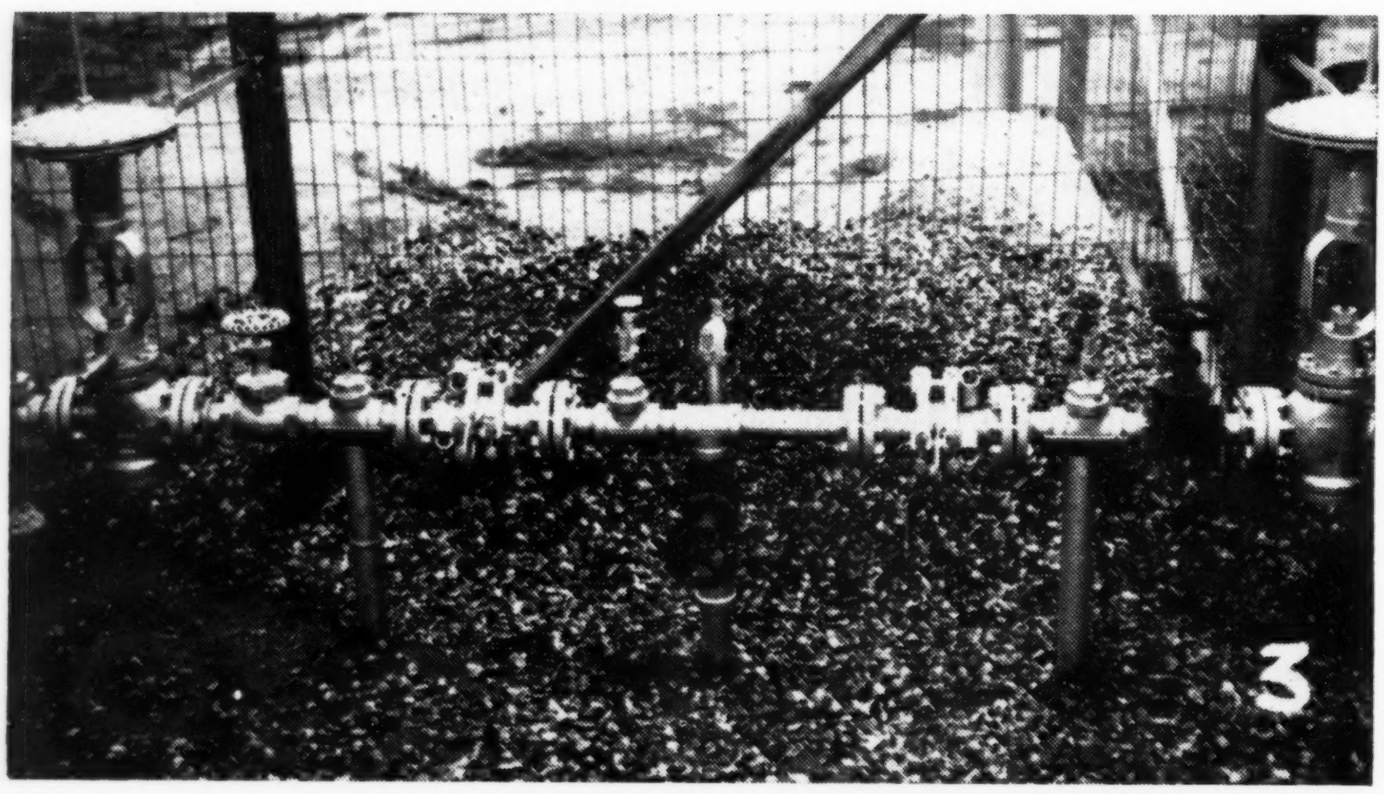
Here, as well as on the inlet to the shipping pump, provision is made for product selection and/or rejection by the bulk plant operator, through blinding flanges, one on each line; again, the position of the spectacle plates must be certified by the bulk plant operator before each shipment.

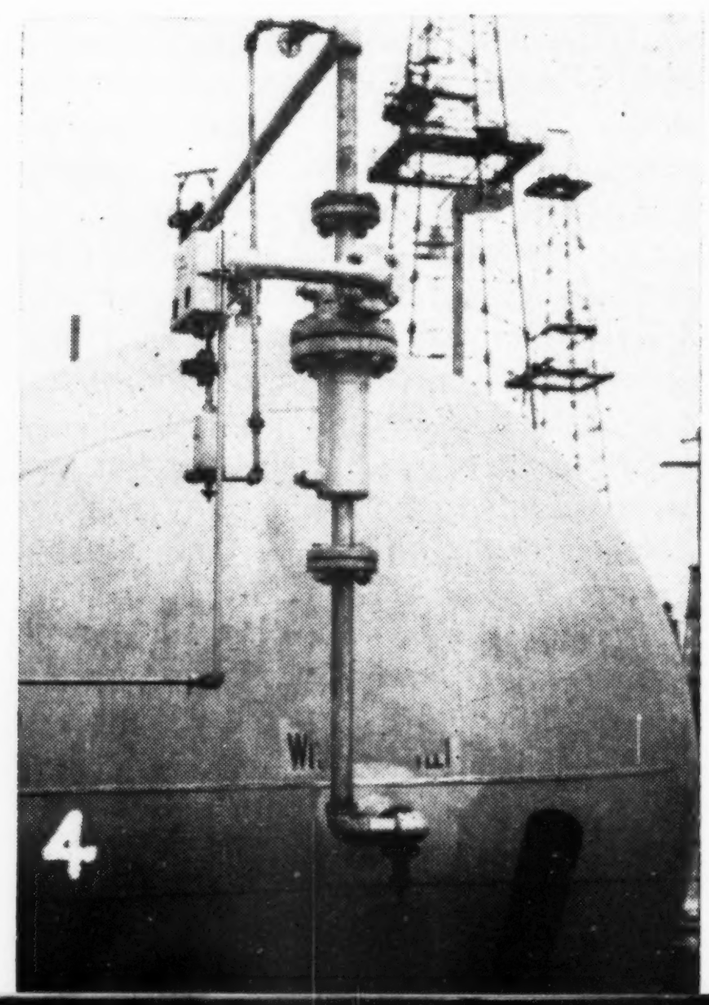
For further control, a positive shutoff valve is provided on each branch line.

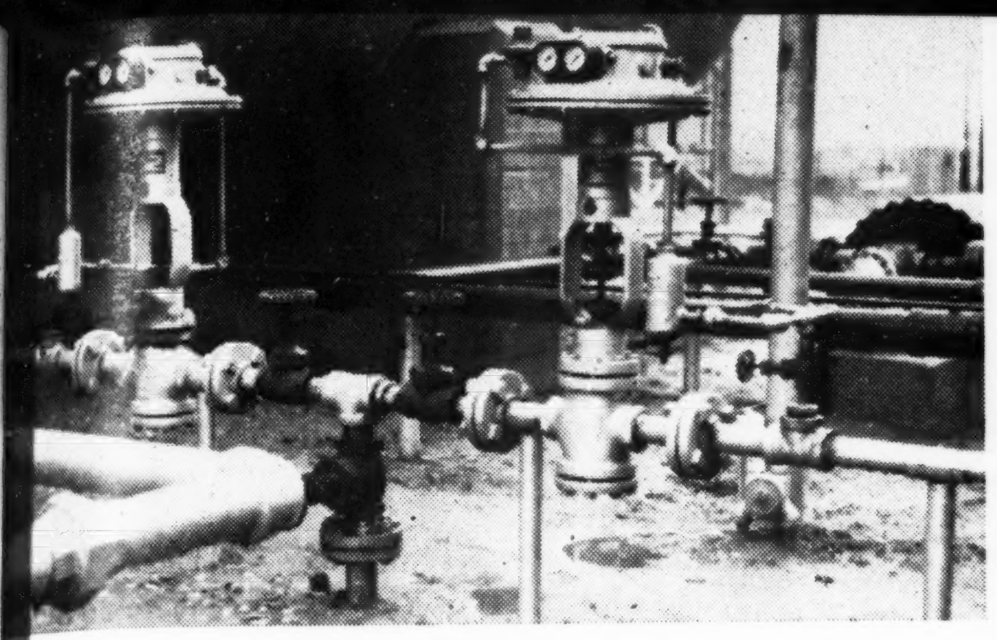
Also shown is a device that is part of what we consider to be a very important safety feature: a cast steel-body, diaphragm motor valve, which is controlled and actuated by a Fisher pneumatic liquid level controller, which stops the flow of incoming liquid if the liquid level in the storage tank reaches a predetermined point at which the controller mechanism is set to operate.

Fig. 4 shows the liquid level controller installation. To provide a true level for the operation of the equipment an opening is provided in the tank head, in this case approximately on the horizontal center line, from which a pipe connection enters the bottom of the float chamber and an equalizing line connects the top of the float chamber with the vapor space of the storage tank. Thus, the liquid level in the chamber follows the level in the tank. The level at which the float contacts and turns the float rod, causing the pressure to bleed off of the control head, thus closing the motor valve on the incoming liquid line, is 85% on the propane storage and 88% on the butane storage. It will be noted that these settings allow a 2% greater outage than is prescribed by the Liquefied Petroleum Gases Safety Orders—again, a little additional margin of safety.

This equipment combination might well be called the "Bulk-Plant Stand-By Operator" for the reason that it is not required or used in normal operation. Usually, the mechanical rotary gauge is used by the operator to determine and watch the liquid level in the tank, and the pumping operation is started or stopped accordingly. Because an **over-filled** tank presents a definite hazard, particularly when liquid is being pushed into the tank by a positive displacement pump, we consider that every possible means of preventing overfilling is justified. At a plant of this size one operator per shift is all that is required and we recognize the possibility of a man becoming incapacitated through illness or accident; consequently, our "Bulk-Plant Stand-by Operator" enhances our feeling of security during the daily shipping periods.







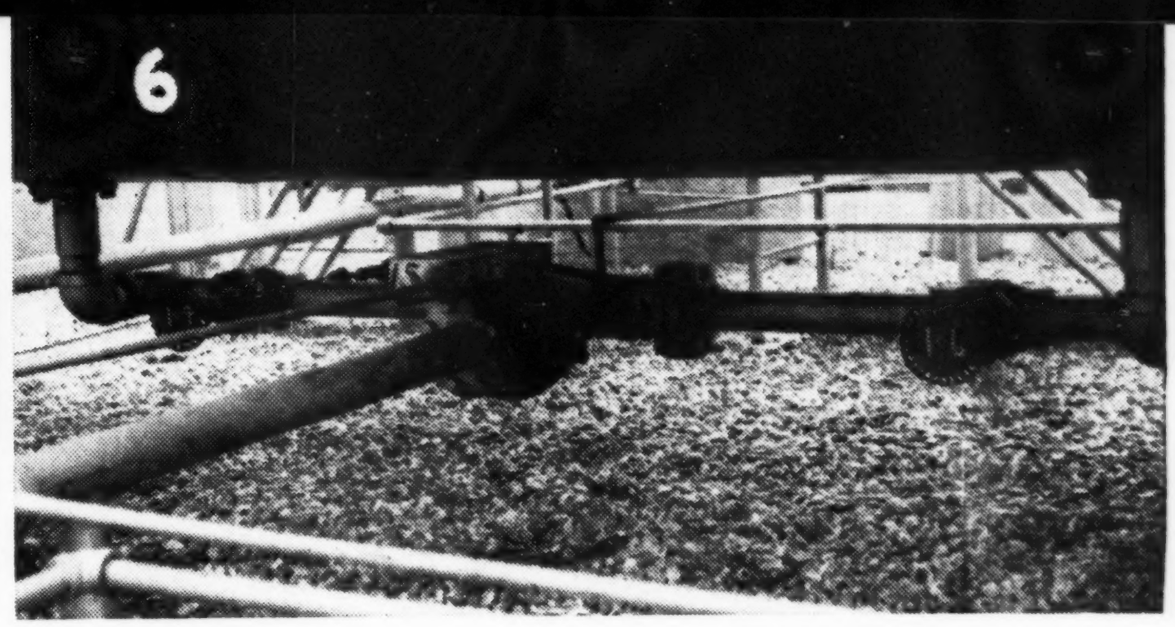


Fig. 5. Now that safe delivery into the tanks has been effected, our main concern regarding storage is to provide a means of safely relieving the pressure inside the containers should the vapor pressure become equal to the tank working pressure for any reason. This has been accomplished by the same type of pneumatic diaphragm motor valve as has already been described. This illustration shows the installation of these pressure guardians.

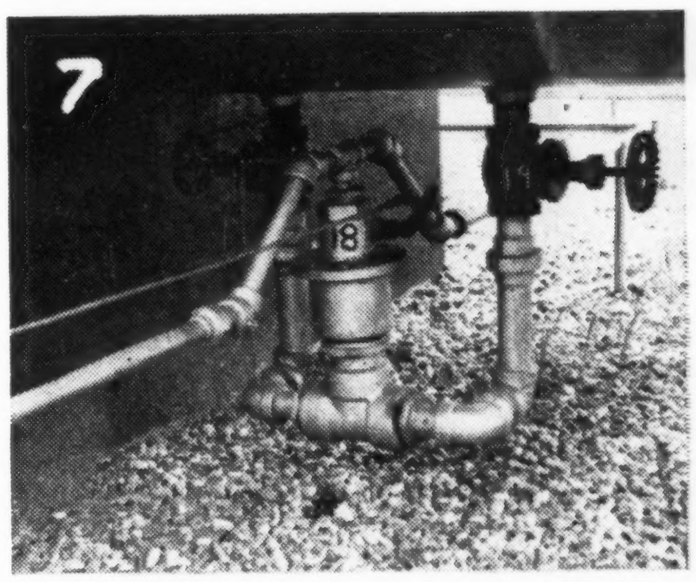
Pipe connections lead from the vapor space of each container to the inlets of the motor valves. The relief valve at the left protects the butane storage and is set to open at 140 psi. The valve at the right is for the propane tank and is set to open at 225 psi. The relief valve outlets are piped through positive shutoff valves into a single discharge line and this discharge is connected into a low pressure gas line, thereby completing a piping system that is entirely closed. No opening or outlet is there to allow the formation of a combustible gas-air mixture.

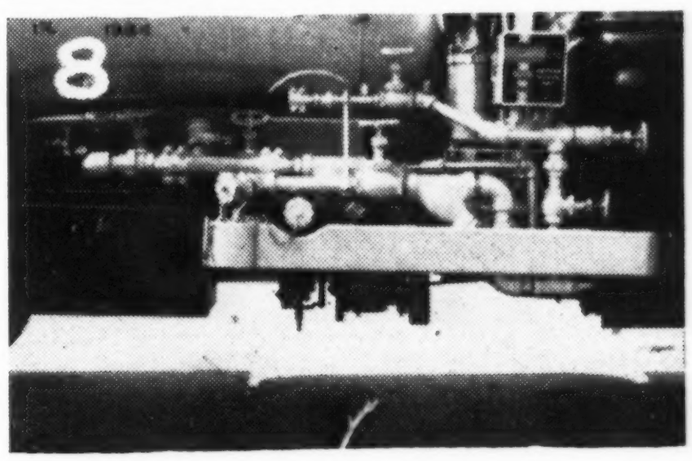
Fig. 6 shows the assembly containing the main storage outlet shutoff. Visible in the foreground are the primary operating control rod and, just above it, the safety control line. Just beneath the tank can be seen a lever to which another operating control rod connects, leading to another operating station. An operating handle is provided at each station to open the valves by manually pulling the valve lever. A spring latch holds the valve open until release is desired. Operation is assisted by various springs and levers wherever necessary.

Fig. 7 illustrates the method used in the installation of the "Remote Control Shutoff" assembly in the vapor system of the same storage tank. In this case, the remote control mechanism is located away from the valve but is identical in principle to the one previously shown.

Fig. 8 demonstrates the amount and type of piping which is incorporated into our 2000-gal local delivery units; on the left hand end of the massive fitting guard may be seen the operating handle of a small-scale remote control shutoff.

All of our long line transports calling at the various refineries and natural gasoline plants to load and unload are equipped in a similar manner, making use of the "remote control" shut-off principle and they embrace safety to the extent of our organization's combined knowledge.





KEEPING LP-GAS SAFE Cont'd

jor portion of the combined production of this area is shipped, reshipped, and delivered through this medium.

For the sake of safety, it is essential that the persons responsible for this operation be well informed, thoroughly trained, and enthusiastically safety-minded, because, in this circumstance they are subjected to equipment beyond their direct control. The valves, devices, equipment and assemblies have not received the benefit of consideration by the company's own engineers, inspectors, specifications board, safety committee, testing laboratory, and the like. Therefore, the personnel assigned to the work of loading and unloading these truck cargo units must have complete product and equipment knowledge in order to make certain that the LP-Gas transfer required can be, and is, made with complete safety.

We found the problem in connection with the safe pumping and transferring of LP-Gas between storages to be the prevention of a gas-air mixture. Loading and unloading truck transport cargo tanks safely requires the same accomplishment.

There is greater possibility of failure in our purpose when transportation equipment is involved, because: (1) connections to cargo tanks must be flexible, adjustable and temporary; (2) the nature of the equipment makes it either impossible or impractical to install some of the devices that are used on stationary installations; (3) most of the fittings used are smaller and consequently somewhat less rugged, and (4) our delivery connections are hooked up to fittings of varying type, age, condition, and assembly, depending upon the extent of the fitter's knowledge of safe practices.

Description of the individual circumstances and failures possible is purposefully omitted because the possibilities embraced by the four reasons cited can be readily envisioned by those who are familiar with any type of pressure piping. The reasons alone suffice to indicate that in the loading and unloading of transport cargo tanks the weakest points, and therefore the greatest potential hazards, are the flexible connections between the truck tank and the storage tank, and the know-how of those handling the operation. The failure of a loading hose carrying the output of a pump producing a flow of 100 gpm does present a hazard, and fast. If such a break should occur during a loading, and the operator should take thirty seconds to reach and close the nearest conventional positive shutoff valve, 50 gal of liquid might be released to the air—enough LP-Gas to cause a flammable mixture in an area approximately 100 ft long, 100 ft wide from the ground to a height of 7 ft, which would be sufficient to engulf the average bulk plant, loading rack, transportation equipment, and *men*.

Realization of this potentiality has prompted Petrolane to develop a "Remote Control Shutoff," which enables the operator to instantaneously cause a positive shutoff of both liquid and vapor flow from the loading terminals by a simple tug on the safety cable which is accessible all along the loading rack and at other vantage points througout the plant. Since this remote control has been completely described in an article recently published,[1] there is no need to repeat the working details. To show the manner of installation, however, *Figs. 6-8* are presented.

[1] E. D. Davies, "Care in Design Gives Bulk Plant Outstanding Safety Features," *Butane-Propane News*, April, 1948; pp. 43-53.

AUTOMATIC WATER FEED

for recording calorimeters

By B. O. COSSEY

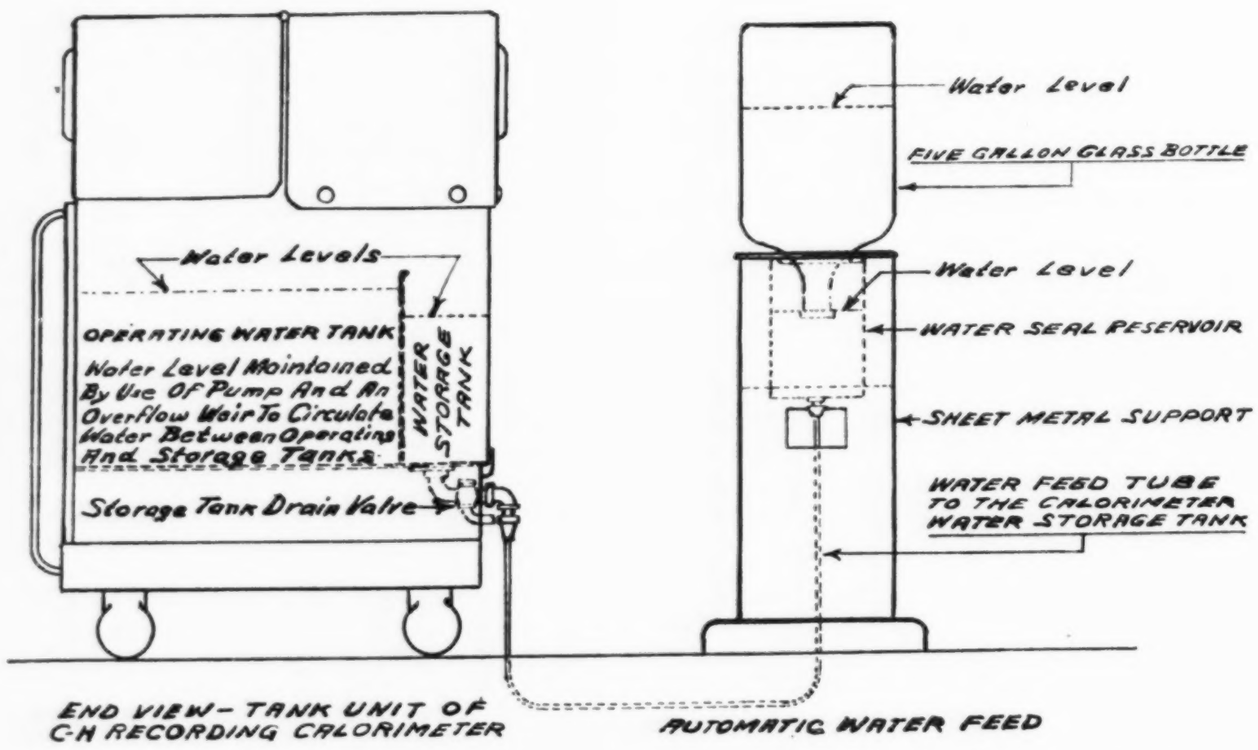
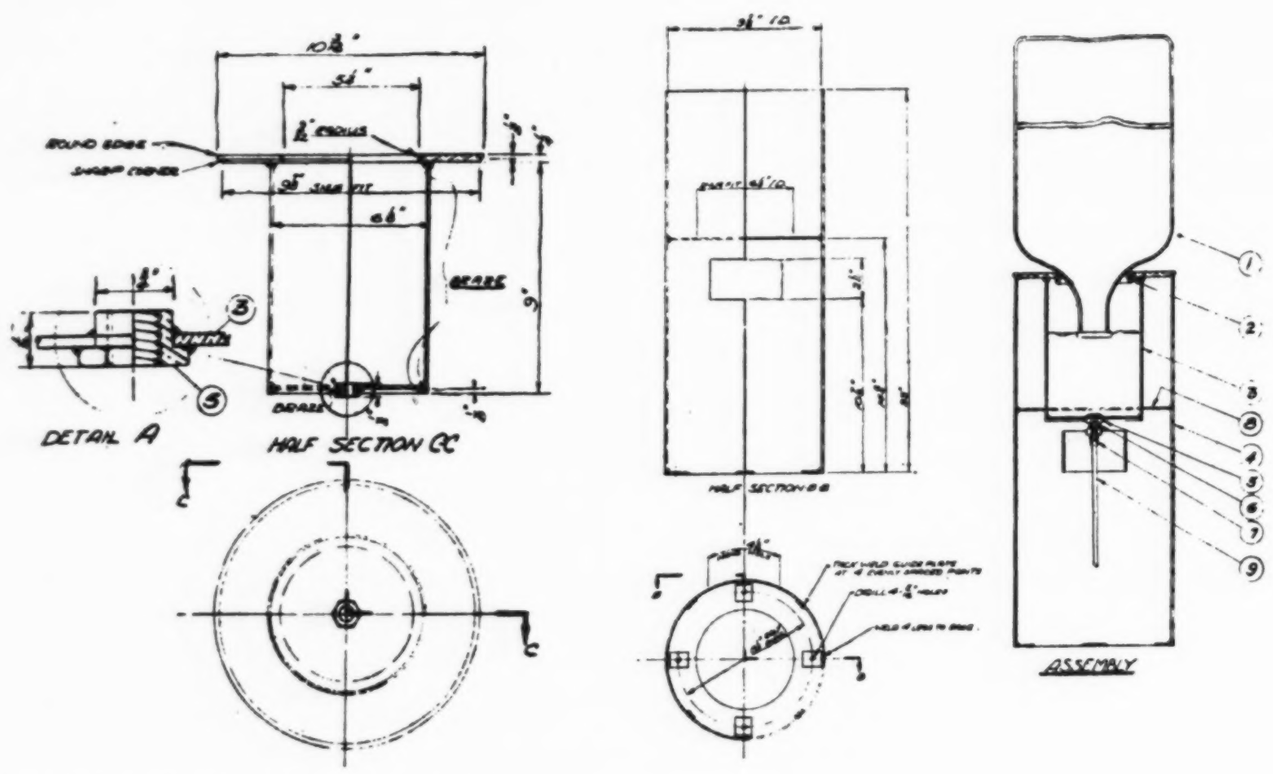

Water Levels
OPERATING WATER TANK
Water Level Maintained By Use Of Pump And An Overflow Weir To Circulate Water Between Operating And Storage Tanks
WATER STORAGE TANK
Storage Tank Drain Valve
END VIEW—TANK UNIT OF C-H RECORDING CALORIMETER
Water Level
FIVE GALLON GLASS BOTTLE
Water Level
WATER SEAL RESERVOIR
SHEET METAL SUPPORT
WATER FEED TUBE TO THE CALORIMETER WATER STORAGE TANK
AUTOMATIC WATER FEED

Fig. 1. Operational details and method of connecting to water tank.



KEY TO RIGHT-HAND DRAWING:

1. 5-gal water jug.
2. Standard water jug rubber to absorb shock.
3. Brass receptacle and bottle suport—butt-type longitudinal weld seam.
4. Sheet metal support base—butt-type longitudinal weld seam.
5. ½ x ¾-in. brass bushing. Turn O.D. down to ¾; shorten to ½-in. length.
6. ¼-in. pipe thread to ⅜-in. copper tubing. Half-union flare coupling.
7. ⅜-in. half union nut, brass.
8. Guide plate—16 gage sheet metal.
9. ⅜-in. copper tube water conduit to calorimeter water storage compartment.

Fig. 2. Construction details of automatic water feed for calorimeter.

THE Cutler-Hammer recording calorimeter is a precision instrument used for the purpose of determining the calorific value of fuel gases. In order that accurate results be obtained the proportions of fuel gas to be tested, the primary and secondary air for the combustion of the fuel gas, and the heat absorbing air must be kept constant. This is accomplished by means of power-driven, water-sealed meters suspended in a tank filled with water to a predetermined level. This water level is maintained by means of an auxiliary or water storage tank from which water is pumped into the main tank containing the proportioning meters, surplus water being drained back into the water storage tank through an overflow weir.

Previous to the use of the automatic water feed, replenishment of the water lost through evaporation was accomplished by pouring water through a funnel leading to a ¾-in. pipe connection to the water storage tank drain valve. This replacement of the approximate 5-gal water loss per week was a slow and tedious operation, coupled with the risk of miscalculation by the operator which would result in flooding the instrument, necessitating siphoning out the excessive quantity of water, and putting the instrument out of service sometimes for several hours at a time.

Also, when make-up water was added by this method, the rapid increase in water height in the water storage tank would momentarily increase pressures to change the volume ratios of fuel gas, combustion air, and heat absorbing air with a resulting erroneous test record during the period of filling and for about one-half hour thereafter. The use of the automatic water feed has succeeded in eliminating all of these undesirable conditions. An added advantage is that a single automatic water feed will supply water in adequate quantity for as many as three recording calorimeters.

Fig. 1 is a sketch showing the operational details of the automatic water feed and the method of connecting it to the water storage tank of the recording calorimeter, and *Fig. 2* is a drawing showing construction details of the device. The device consists essentially of a brass water seal reservoir of about 2-qt capacity housed in a sheet steel base. The opening in the top of this reservoir is large enough to accommodate the neck of an inverted 5-gal. glass bottle. From the bottom of the reservoir a ⅜-in. copper tube extends to the existing drain valve in the bottom of the calorimeter water storage tank.

The supporting base of the device is of such a height that the desired water level of the water storage tank is at approximately the same height as the opening in the neck of the bottle. When the level of the water in the calorimeter water storage tank falls, the water seal at the neck of the bottle is broken. When this water seal is broken, air is automatically introduced into the bottle causing water to flow into the calorimeter water storage tank in sufficient volume to restore the former water levels, at which point the seal at the neck of the bottle is re-established, thereby stopping the flow of water.

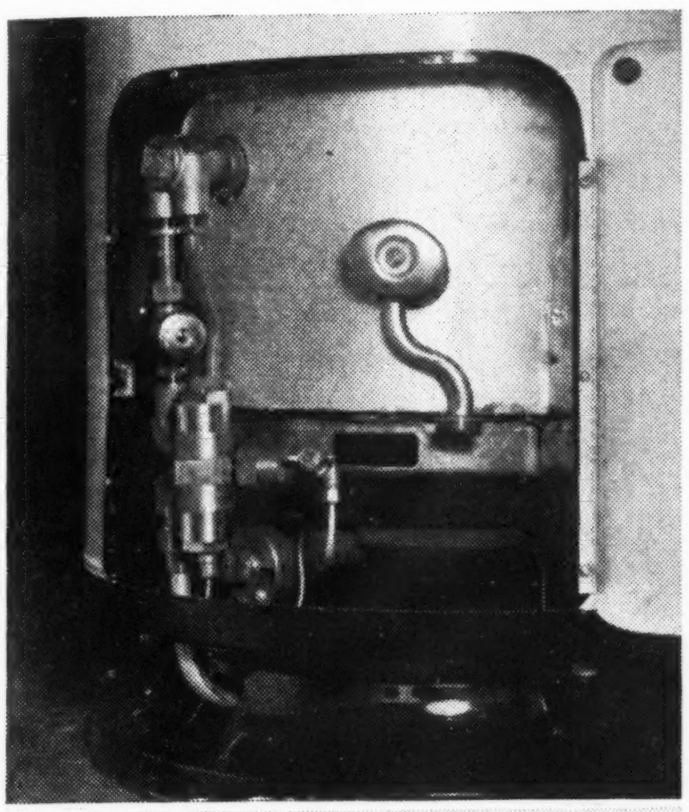
Mr. Cossey, of Southern California Gas Co., presented this paper at the PCGA Technical Section's technical service group conference in Los Angeles, April 28-29.

COMBINATION CONTROLS

A review of recent developments in the field of combination controls for automatic domestic heating and cooking appliances, primarily water heaters, ranges, and house heaters—with particular emphasis on controls which perform more than one function, such as acting as shut-off valve and thermostatic control.

By S. G. ESKIN

WATER HEATERS



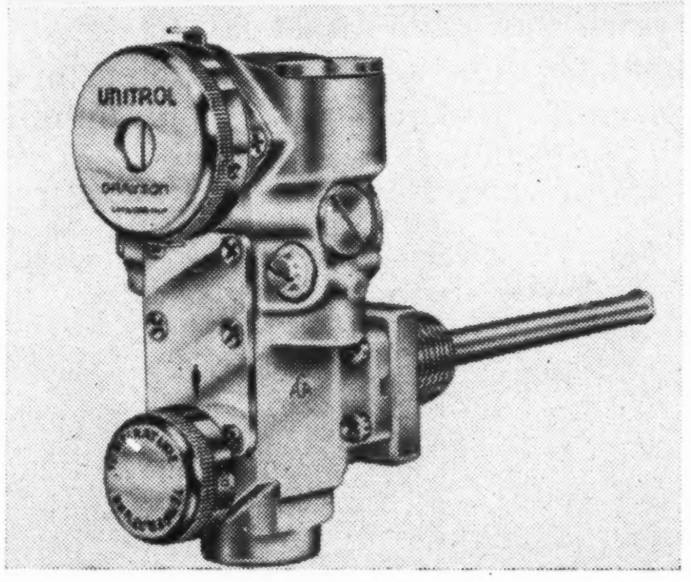


Fig. 1 (upper). Application of the automatic pilot and other controls to a water heater.

Fig. 2 (lower). Unitrol, general view.

THE first photo shows a group of separate controls applied to a gas water heater, consisting of the main gas valve of usual plug type, a simple snap action thermostat, an automatic pilot (the design of which will be described in greater detail later in the article), a pilot burner valve including means for pilot rate adjustment, and finally a pilot gas filter. It is apparent that a great deal of installation time is required to apply this group of devices to a water heater. Also it is quite difficult to write simple instructions to make it possible for an inexperienced person to light the burner of the water heater, if that becomes necessary.

Exclusive

The group of controls mentioned above has been combined into one unit as shown in *Fig. 2.* This is the so-called Unitrol, a postwar model incorporating many new features. It is a relatively small control considering its large gas capacity. It utilizes two knobs—one for the manual control of gas flow, and the other for setting the desired temperature of the thermostat.

In *Fig. 3* are shown some of the design features of this device. A plug valve of generous size is used to control the flow of main gas and also of the pilot gas. The thermostat is the well known rod-and-tube type operating a snap-action mechanism in which a circular formed disc clicker is utilized to provide the thermostat valve with snap movement. The center deflection of the clicker is amplified by means of levers to obtain the desired valve opening.

This thermostat valve is also under the action of a magnet which is the safety part of the control. The magnet, which is housed in the cylindrical cup, is energized by a thermocouple placed in the combustion chamber of the appliance, and if the pilot burner is burning, it allows the main valve to operate under the action of the rod-and-tube element and the clicker assembly. It requires about 5 lb to push the armature from the magnet when the thermocouple is heated by the pilot burner.

The control also has a pilot gas valve with a means for adjusting the pilot gas flow. The pilot gas enters its valve through a filter, which is particularly necessary on many manufactured gases containing gum and also on some natural gases where there may be dust in the lines. The filter is located at the upper right hand corner of the control. The thermostatic valve is accessible for inspection and cleaning by the removal of the front plate.

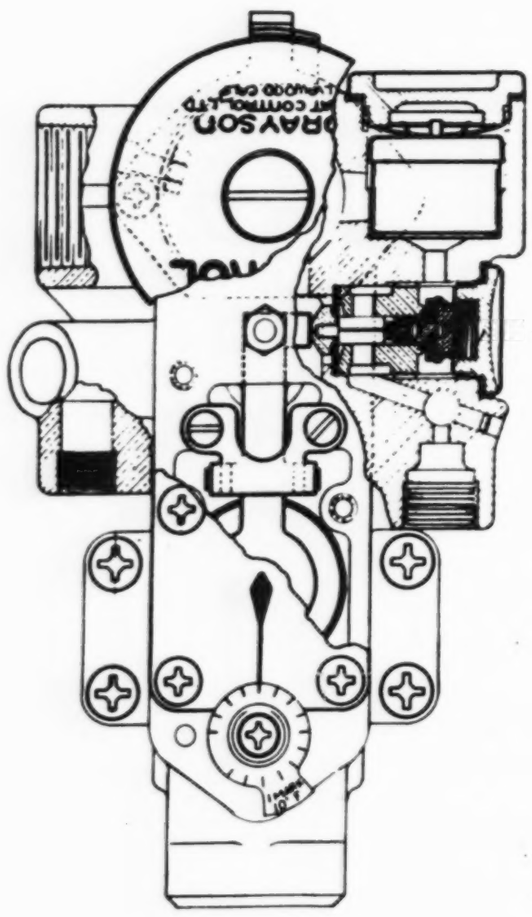
To start the heater, the large upper knob is rotated to the pilot position and then pressed in while the pilot gas is being lit. The inward movement of the knob pushes the small rod by means of a cam cast into the knob and thereby presses the armature of the magnet against its pole faces. After the pilot burner is allowed to heat a fraction of a minute, sufficient electromotive force develops in the thermocouple circuit and the armature will remain attracted to the pole faces of the magnet. While the knob is in the pilot position, no gas can flow to the main burner. This is accomplished by porting the plug valve, as will be explained later.

The front temperature adjustment is effected by turning the temperature adjustment knob, thereby changing the position of a lever with respect to the invar rod.

"In an article of this scope it was not possible to touch upon many technical details of the combination controls for domestic gas heating and cooking appliances," states S. G. Eskin, author of this article.

"However, it should be apparent to the reader that the art and science of engineering and manufacturing such combination controls have reached a high level of development. It should be pointed out that continuous research and development is being carried out to further improve the design and performance of this class of controls. This research will result in new devices having greatly improved performance characteristics, enhanced serviceability and other advantages."

Mr. Eskin has an impressive background in the field of controls and instrumentation. A B.S. from MIT and an M.S. from Northwestern have been complemented with post-graduate work at the former institution and extension courses in a wide range of subjects from patent law to photoelasticity and theoretical mechanics. He has done development and research work with Edison General Electric Appliance Co., American Thermometer Co., Robertshaw Thermostat Co., and Robertshaw - Fulton Controls Co., of which he is presently director of research at the company's West Coast laboratories in Los Angeles.



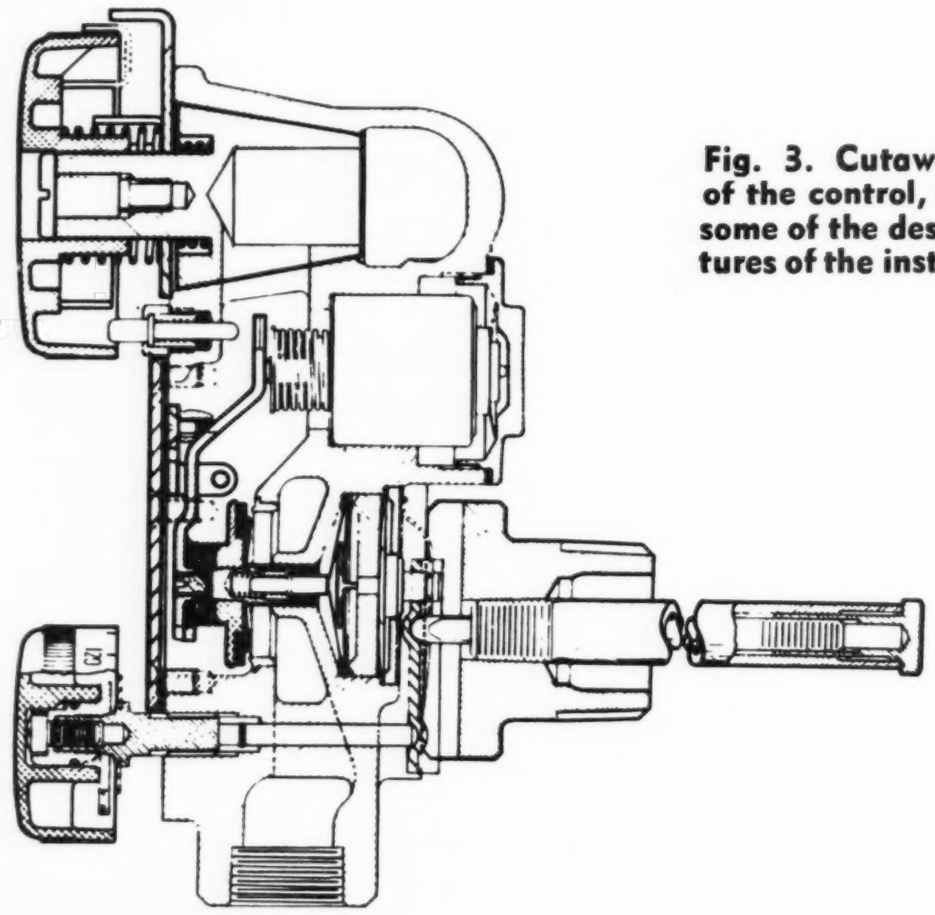


Fig. 3. Cutaway view of the control, showing some of the design features of the instrument.

The main plug valve has means for adjusting the amount of gas desired in the main burner. This is obtained by means of the adjustable stop limiting the rotation of the plug of the valve.

To meet specific conditions obtaining in many localities, the body of the control is made of a special aluminum alloy unaffected by the sulphurous compounds present in varying amounts in many natural and manufactured gases.

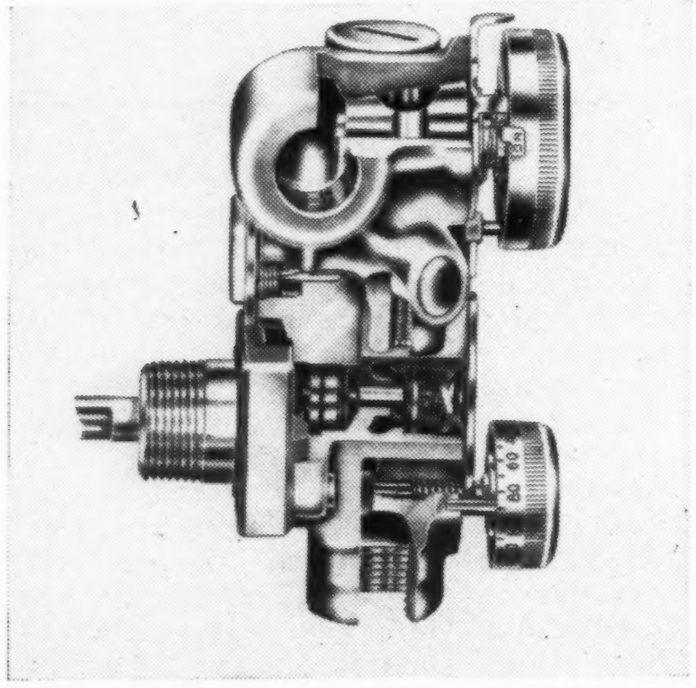


Fig. 4 (left). Cutaway view of Unitrol.

Likewise, the shank on which the rod-and-tube assembly is mounted is made of a special copper alloy which withstands the action of the various local waters into which it is immersed.

An important servicing feature of this control is the mounting of the main body of the control on the shank by means of four screws. This makes it possible to remove the control without draining the tank, if it is necessary to service the control in a central service station.

An important operating feature of this control is the fact that in case the pilot burner goes out and the magnet allows the main valve to close, the pilot gas valve will also close, providing what is known as 100% shutoff. Thus this control incorporates both safe lighting when starting an appliance, and complete shutoff in case of pilot outage.

Fig. 4 shows, in some detail, the porting of the plug valve and also the construction of the thermostat valve.

It might be of interest to compare the post-war device with the one used before the war. This is shown in *Fig. 5*, which also illustrates the various stages in the development of the new control. The control at the extreme left is the pre-war production unit. Next to it is the first sample of the current model, which was made rather large to enable changes to be made as the testing of it progressed. The sample in the middle

Fig. 5 (below). Old and new models.

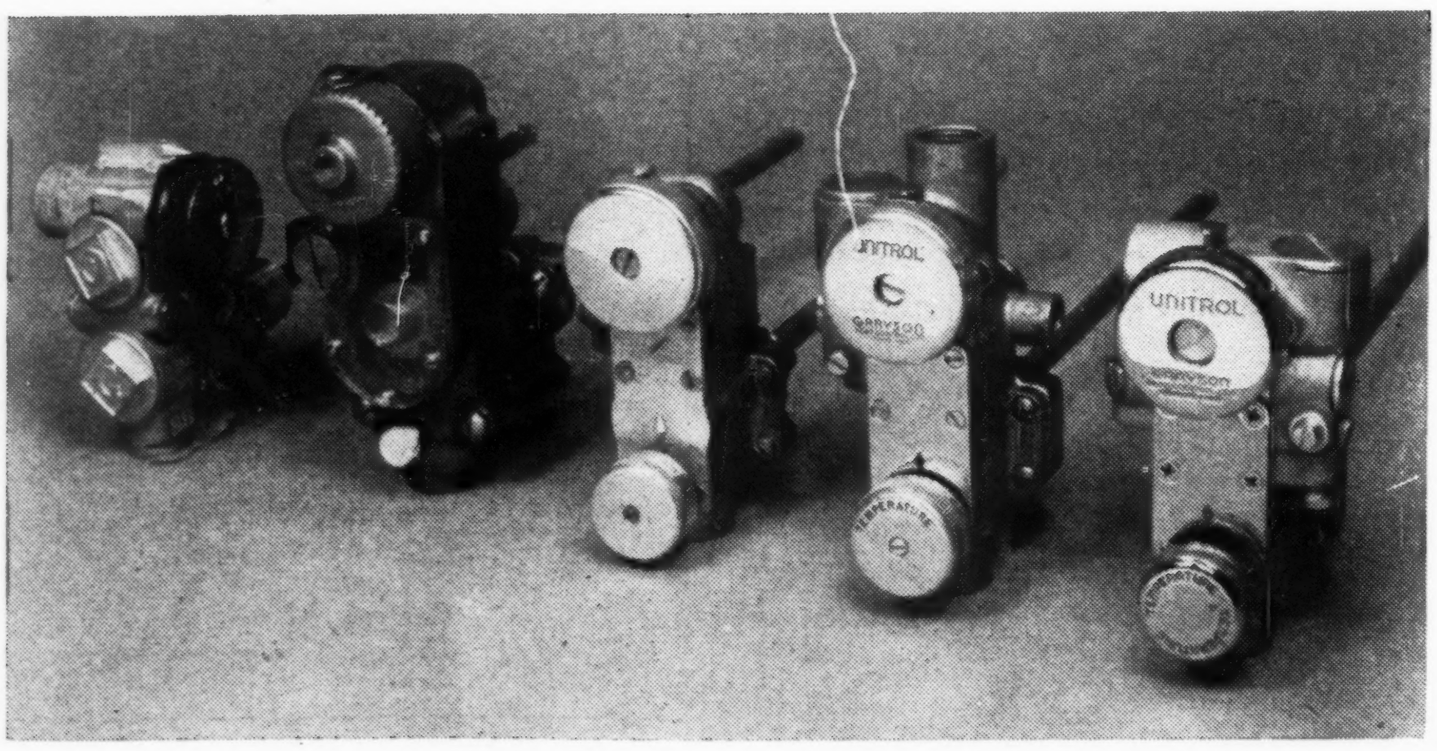
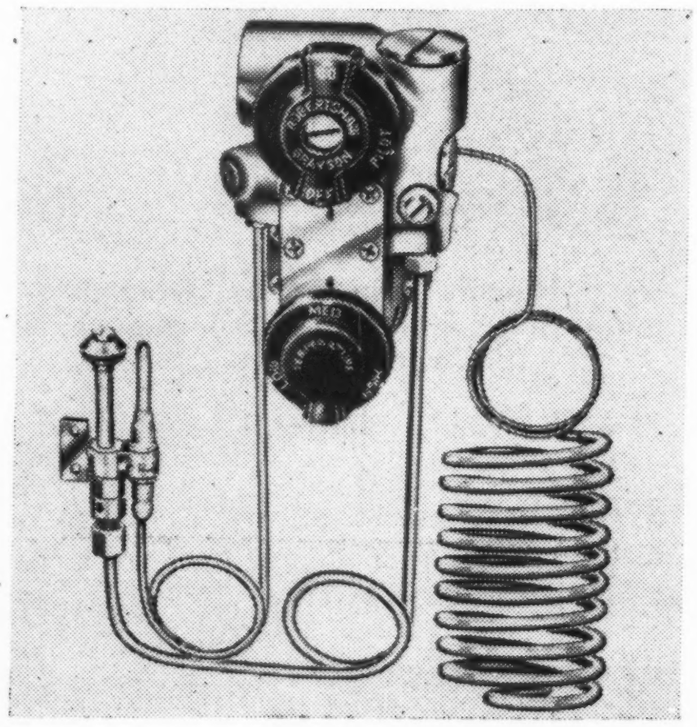
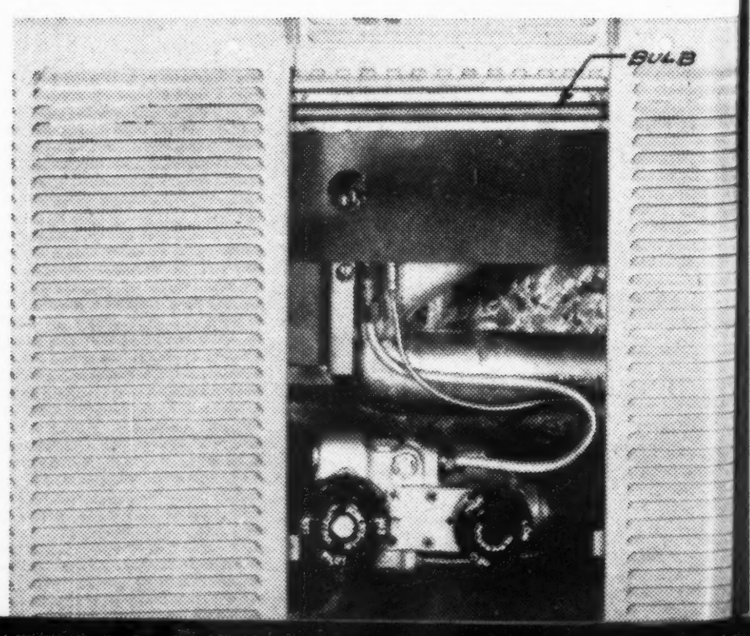


Fig. 6 (upper). Space heater unitrol.

Fig. 7 (lower). Installation of space heater Unitrol in a wall heater.





of the figure is the experimental unit, reduced in size to what would be considered satisfactory for production. Next to it is a more advanced model where additional improvements have been made, with the filter added to it and having a vertical gas inlet. The last control is the one accepted for production, using a horizontal inlet for convenience of piping, and thereby placing the filter on the opposite side.

The control in its final form has a pleasing appearance, with the knobs and the cover plate either chrome plated or provided with attractive finishes. The Unitrol is very compact and was designed to make servicing and installation simple and convenient.

SPACE HEATING

ANOTHER GROWING APPLICATION of the Unitrol is in the field of house heating. *Fig. 6* shows the space heater Unitrol in which the rod-and-tube thermostatic element has been replaced with a bulb and bellows assembly. The bulb shown in this figure is 60 in. long, and is very sensitive: the thermostat has a maximum temperature differential of 3°F when the bulb is slowly heated and cooled.

In actual application the bulb is placed in the cold air return of the heater, responding to the flow of cooler air from the room. With a very large surface of the bulb being exposed to the flow of air, exceptionally good temperature regulation is obtained.

Fig. 7 shows a typical application of the space heater Unitrol to a wall heater. In this case a 12-in. bulb of a larger diameter was used for convenience in mounting. With this control, the degree of over-shoot in the room has been reduced quite considerably.

This control has been successfully applied to various heating appliances such as floor furnaces, single and double wall heaters, console heaters and combination ranges. The performance of the control was found to be satisfactory in houses of different designs under extremes of weather conditions. It is predicted that this control will find extensive use for house heating appliances due to its low cost, simplicity of installation at the factory, ease of servicing and close temperature control of the space being heated.

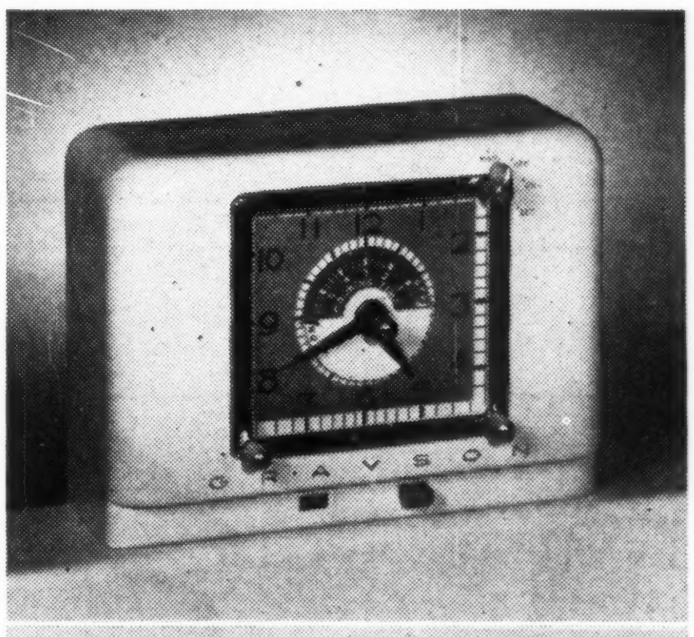
CLOCK

A DESIRABLE FEATURE for domestic ranges is the automatic clock which makes it possible to operate the oven in the absence of the housewife. *Fig. 8* shows the postwar clock, which is also a combination device incorporating an automatic pilot. This clock has been simplified to a point where practically no instructions are necessary for its operation.

The valve mechanism which is being operated by the clock is shown in *Fig. 9*. This again is a combination arrangement using one valve which is acted on by the clock and also, through a lever system, by the magnet of the automatic pilot. The design is such that no gas can flow to the main burner while the magnet is being set. An indicator, utilizing a lever system and a flag, shows whether the magnet is in the "on" or the "off" position.

The clock and its valve have been so designed that it is possible to remove the clock readily for service from the front of the range. The clock fits over the two buttons of the automatic pilot, and is held in place by springs attached to the buttons. When the clock is removed, the valve remains in the open position, under the control of the magnet, requiring no manipulations to make it possible to use the oven by manual operation. The mechanism shown in *Fig. 9* is enclosed in a die cast housing in actual use.

Fig. 8. (Above). Automatic clock.
Fig. 9. (Below). Clock automatic pilot.

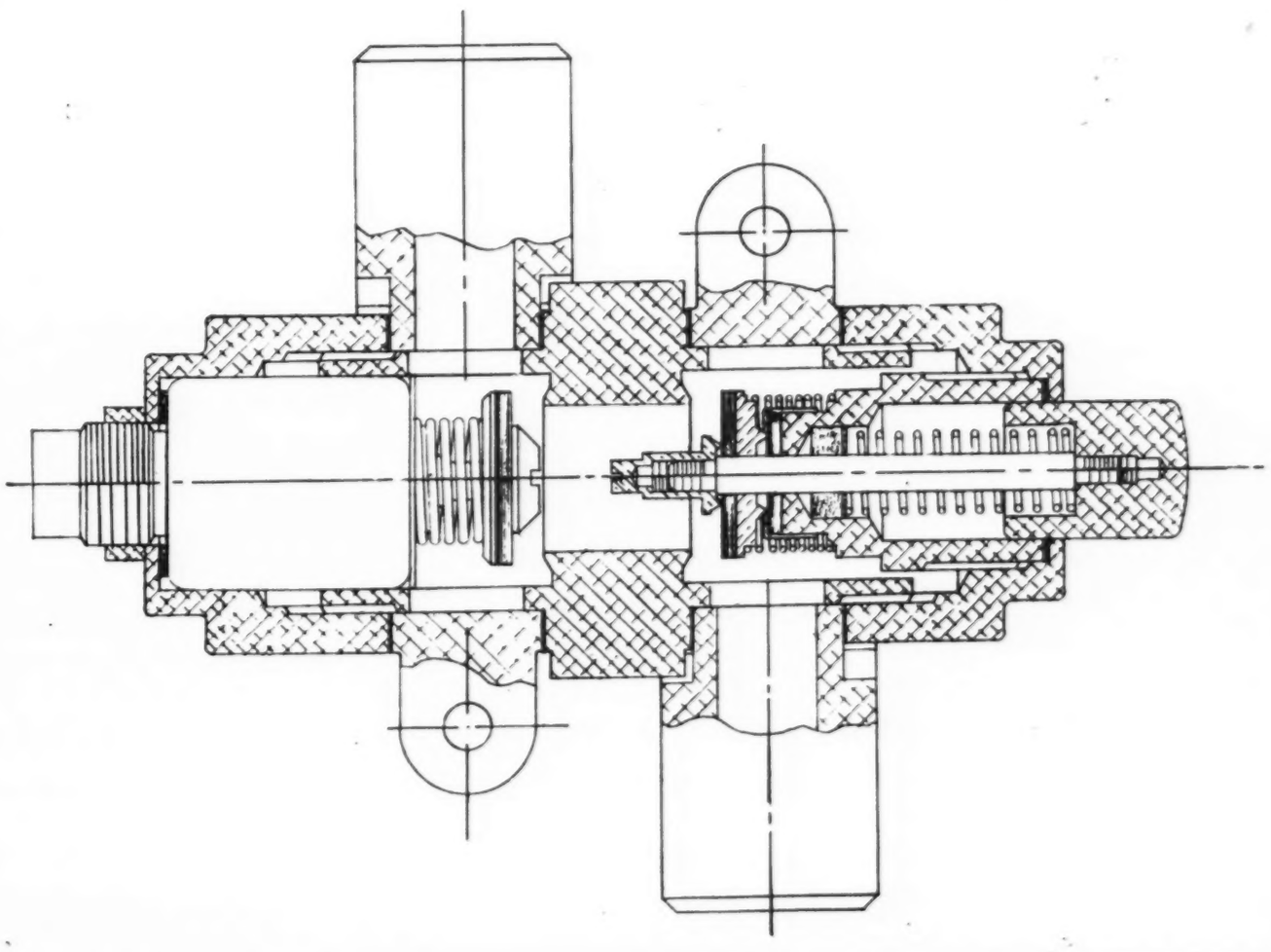


RANGE PILOTS

WITH THE GREATLY EXPANDING DEMAND for automatic lighting of gas range broiling and baking ovens, automatic pilots for such applications had to be developed. *Fig. 10* shows a cross-section of an automatic pilot, also of the thermomagnetic type. It includes the safe lighting feature which, in this case, is obtained by a flow interrupter valve, preventing the flow of gas to the main burner while the armature of the magnet is being held manually against the pole faces, during the heating period of the thermocouple. The flow interruption is accomplished by a valve which closes when the push button is pressed in and opens when the button is released after lock-up of the magnet has taken place, retaining the primary valve in the open position.

A feature of this control is the manner in which the two gas connectors are mounted on the main body. The gas

Fig. 10. Cross section of automatic pilot for gas ranges.



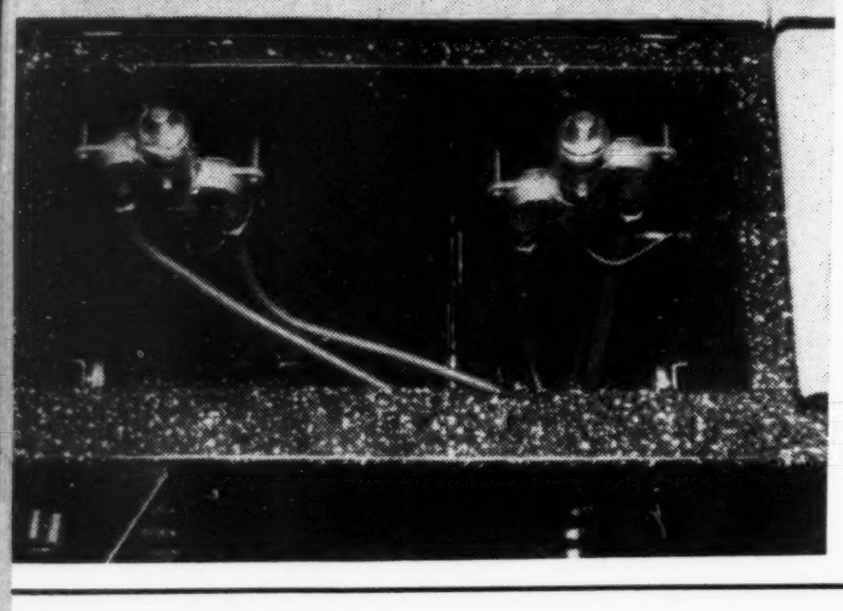
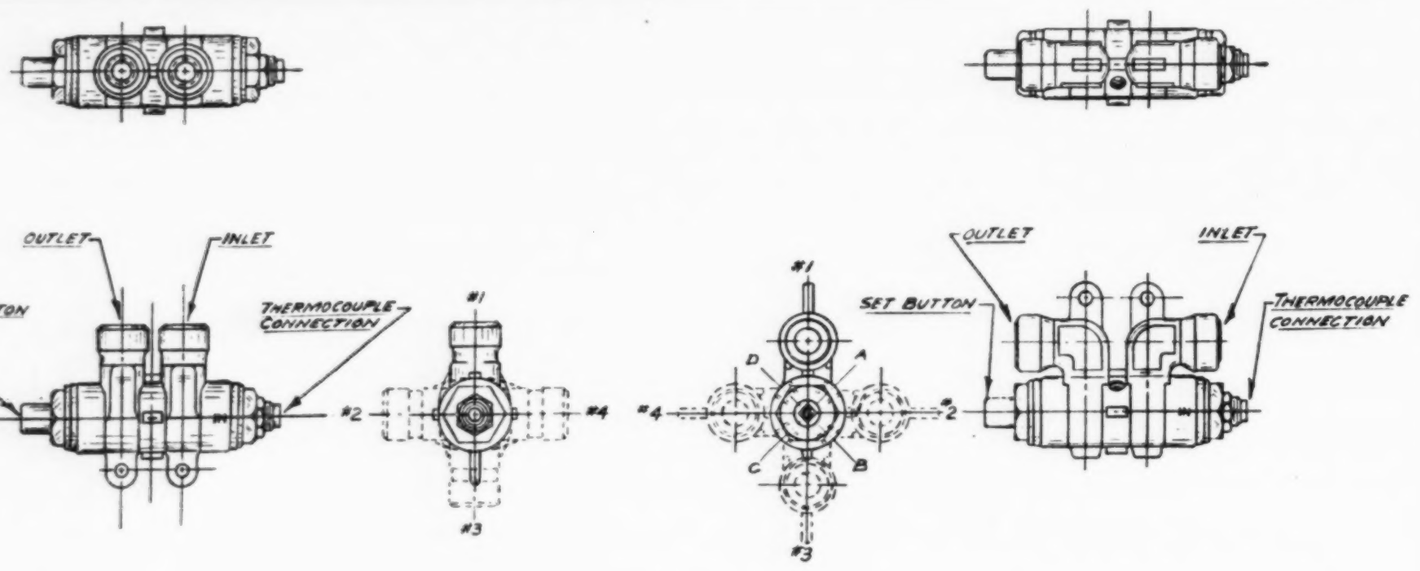


Fig. 12. A typical application of automatic pilots to a gas range.

Fig. 11. Range automatic pilots with straight and angle connectors.



connectors are separate units, held in place by the end nuts containing the magnet assembly and the push button assembly. The connectors can be located in a number of different positions, and can be of different shapes.

Fig. 11 shows the controls with straight and angle connectors and suggests the possibility of having the connectors at various angular positions, one to another. It is also possible to combine a straight connector with an angle connector, and furthermore the direction of the angle connector can be varied, which gives an extreme degree of flexibility obtained with this unit.

A typical application of this automatic pilot is shown in *Fig. 12*, where two controls for the broiler and baking ovens are placed in the storage compartment of the range. Where no storage compartments are available, the controls are usually mounted in the rear of the top burner section of the range.

COMBINATION THERMOSTAT

THE COMBINATION TEMPERATURE CONTROL for gas range ovens consists of a plug valve and a hydraulic element-diaphragm operated thermostat valve. It is a single dial control, the one knob being used to regulate the flow of main burner gas by means of the plug valve and also to set the temperature to be held in the oven. *Fig. 13* shows the plug valve and also the interlock mechanism, as well as the hydraulic thermal element.

Fig. 13 also shows the manner in which the thermal element actuates the valve of the thermostat. The expanding portion of the thermal element consists of two stainless steel corrugated diaphragms nested one into the other, and welded around the periphery. The bulb of the thermal element and the capillary tubing are filled with an expanding fluid at a high vacuum, eliminating all possibility of air remaining in the thermal element.

Upon the expansion of the liquid in the bulb due to rise of temperature in the oven, some of the fluid is transmitted through the capillary tubing into the diaphragm which expands and moves the valve toward the valve seat, reducing the opening for the flow of gas. When the desired oven temperature is approached the valve closes practically completely. The thermostat is of the throttling type and provision is made for by-pass gas flow which is not under the control of the thermostat valve. The thermostat is provided with an adjustment for setting the amount of gas flow through the by-pass. It also has means for the pilot burner takeoff with its adjustment. Both the by-pass and pilot burner adjustments are so located that changes in the rates can be made from the front of the control by simply removing the knob.

The thermostat has a compensating device built into it which prevents any change in the oven temperature owing to rise of temperature around the control itself when top burners are in operation, resulting in the increase of ambient temperature in the vicinity of the thermostat.

The entire control is made of aluminum alloys resistant to the action of sulphur which may be contained in various gases. The plug valve casting of the control is made of a special aluminum alloy which was found to be superior to brass for this purpose, particularly at high ambient temperatures. The bulb and tubing of the thermal element have been given a protective coating which prevents oxidation and the action of moisture and products of combustion.

A general view of the thermostat is shown in *Fig. 14*. The large knob has clearly readable temperature markings. The calibration of the thermostat can be readily changed by removing the knob and following the instructions indicated on a sub-dial. The control is provided with a convenient means for attaching it to the manifold of the range. It is easily taken apart for field servicing if that becomes necessary.

Since this is a throttling thermostat, the oven temperature is held very closely, in some cases approaching straight-line regulation. At the same time the thermostat responds very quickly to sudden changes in temperature, such as may take place when the oven door is opened for placement of food into the oven.

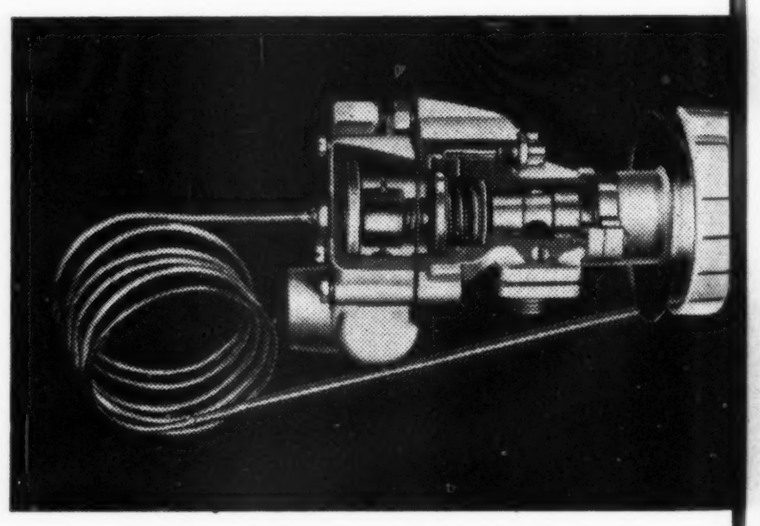
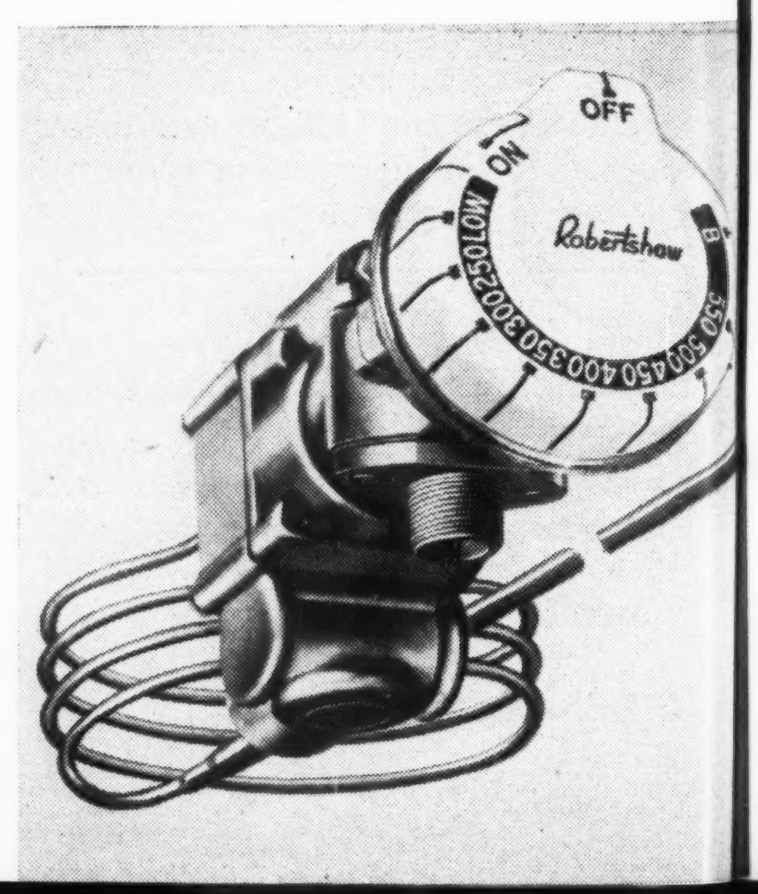
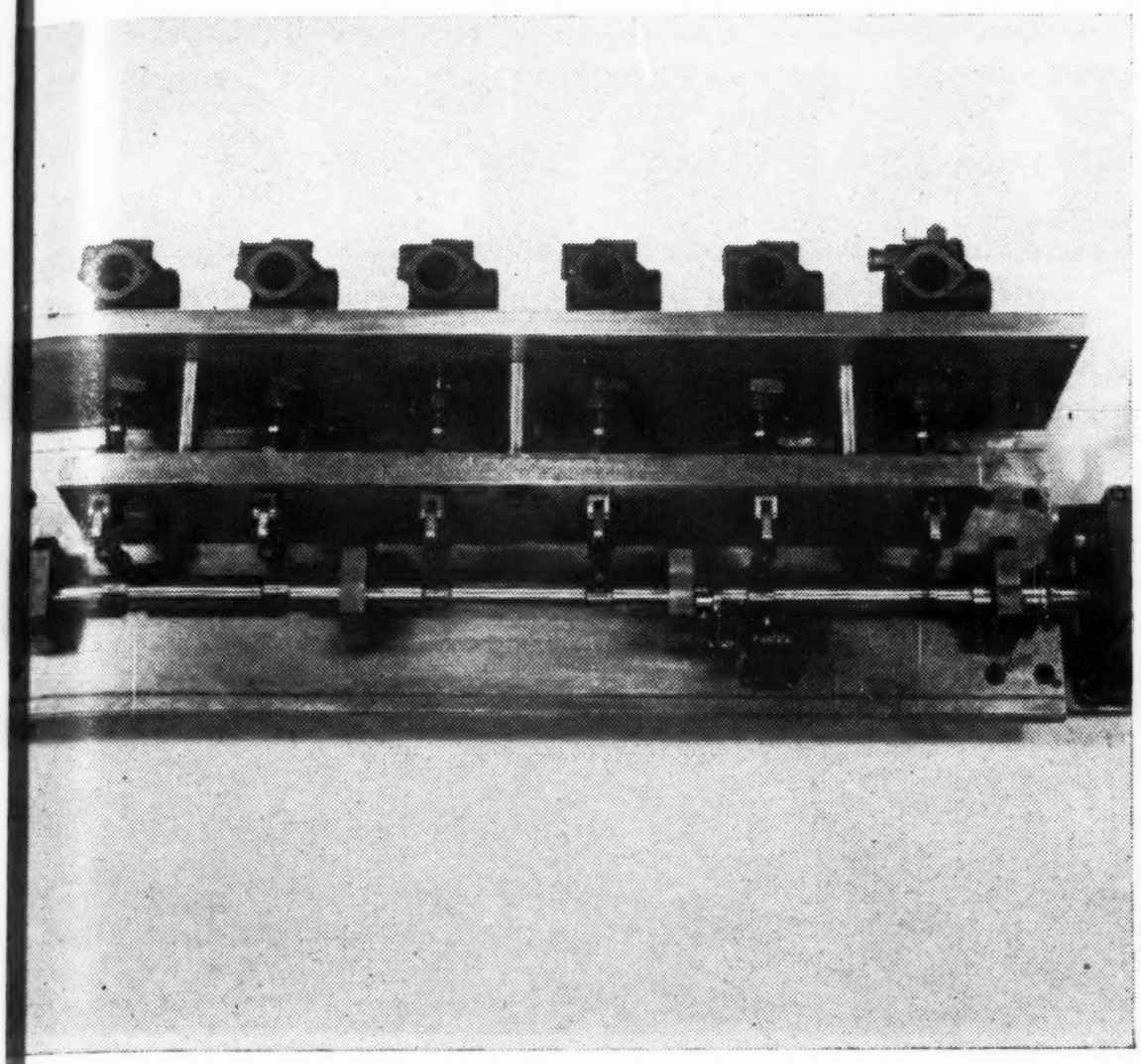


Fig. 13. Cross-section view of oven heat control.

Fig. 14. General view of identical oven heat control.





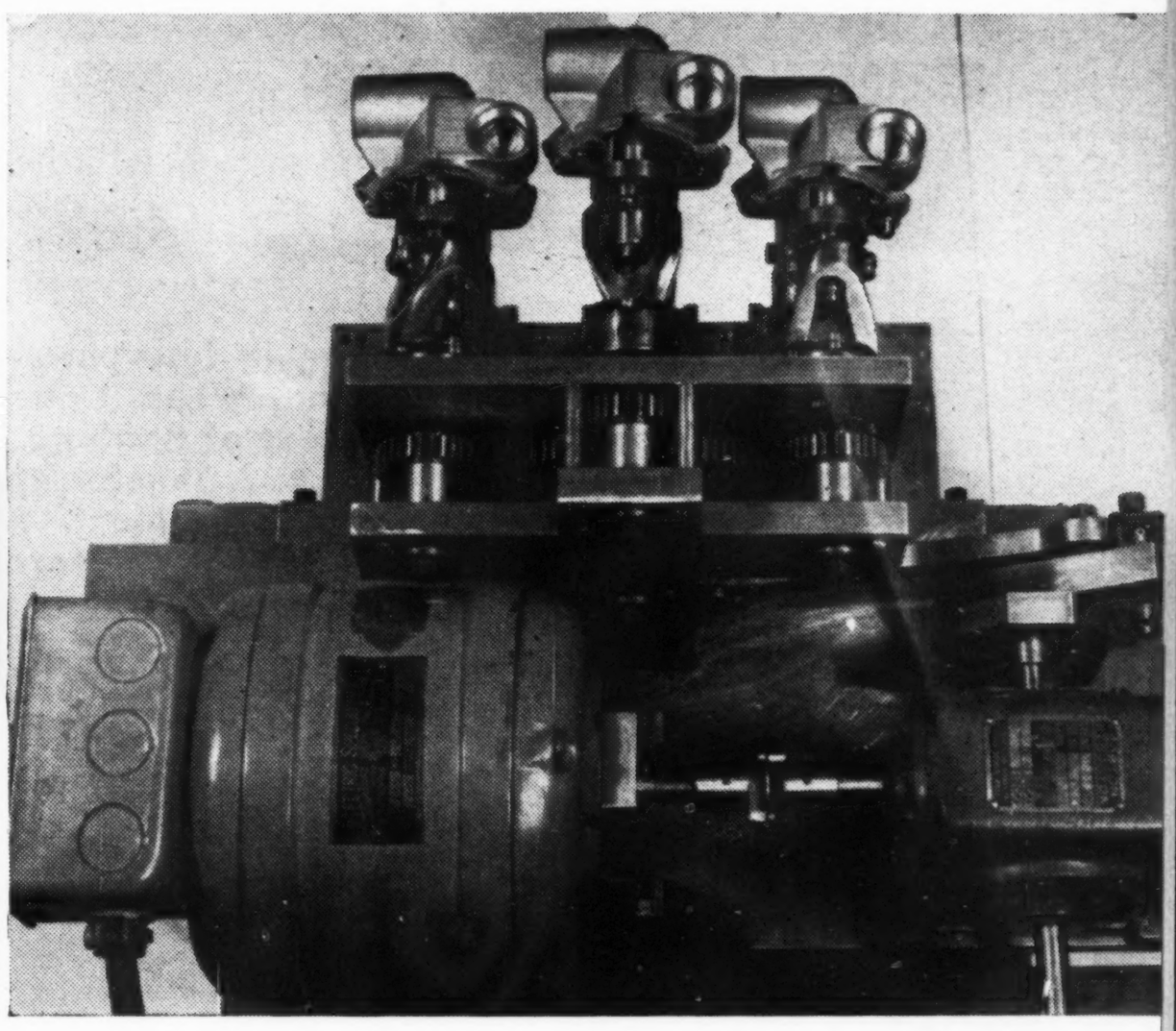


Fig. 15 (left). Clicker life test machine

Fig. 16 (right). Plug valve life test machine.

LIFE TEST

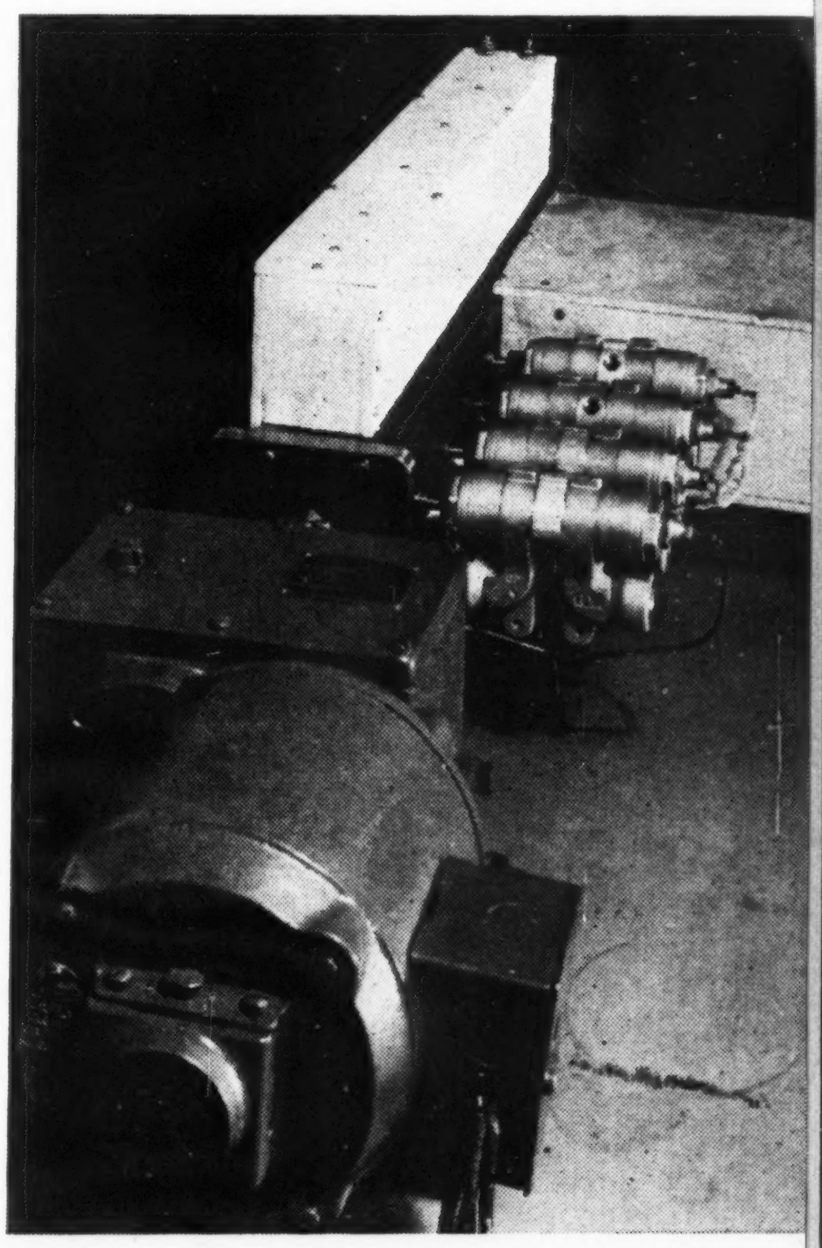
CONTROLS FOR DOMESTIC AUTOMATIC APPLIANCES often operate under unfavorable conditions. They may not be observed for long periods of time, and are expected to be fool-proof both when the appliance is originally placed in service and during its operation, sometimes continuously for many years. In order to provide this type of performance, extensive life tests were carried out during the initial development of the controls and after, when they were placed in production. Some of the equipment for life tests will be briefly described and illustrated.

Fig. 15 shows a machine for testing water heater thermostats and clickers, which are extensively used in these controls for obtaining snap action operation. This is a six-position machine and, when desired, the thermostat bodies are enclosed in a heated box to operate them at any suitable elevated temperature.

The deflection of the clicker during the life test is adjustable by means of screws and can be set at any desired value. Usually the clickers are subjected to considerable over-travel during the test, to assure long life in service.

Another important requirement for these controls is that plug valves should be easily turned after many rotations, or when standing inactive for long periods of time. To evaluate the performance of plug valves, a special machine was designed as shown in *Fig. 16*. Means are provided to stop the rotation of the plug if the required torque exceeds a certain value. The angle of rotation of the plug is adjustable. The machine is also provided with a heating box so that the controls can be subjected to various elevated temperatures. By means of this machine the most suitable alloys for plugs and castings were investigated, and also the lubricants which are employed to prevent leakage and to obtain free rotation of the plug after long periods of time in service.

The range automatic pilot, which is made up of five major parts, required a great deal of stress analysis investigation, since its design was radically different from valves previously made. The stresses in the parts were studied by means of electrical strain gauges. To prove that the stress analysis was correct, a machine was built to subject the valves to stresses which would take place in service. *Fig. 17* shows this machine with a group of controls mounted on it. Four of the samples are shown being tested at room temperature, and three more are being operated at a high ambient temperature inside the heated enclosure. The mechanisms for operation of the valves and the switching arrangement for the magnets are shown in *Fig. 18*.



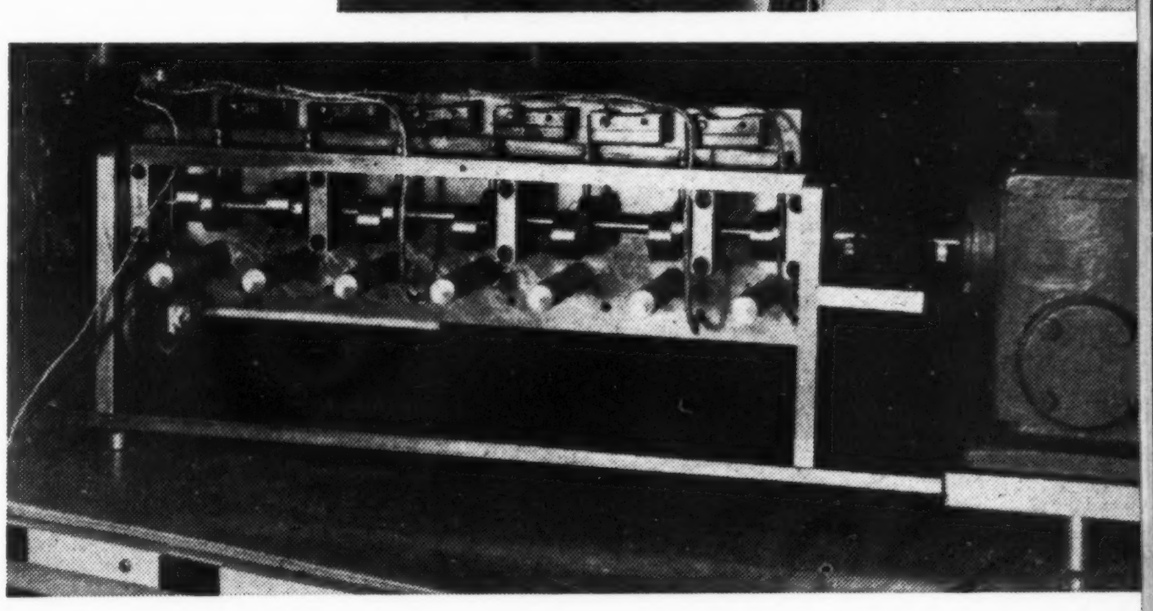
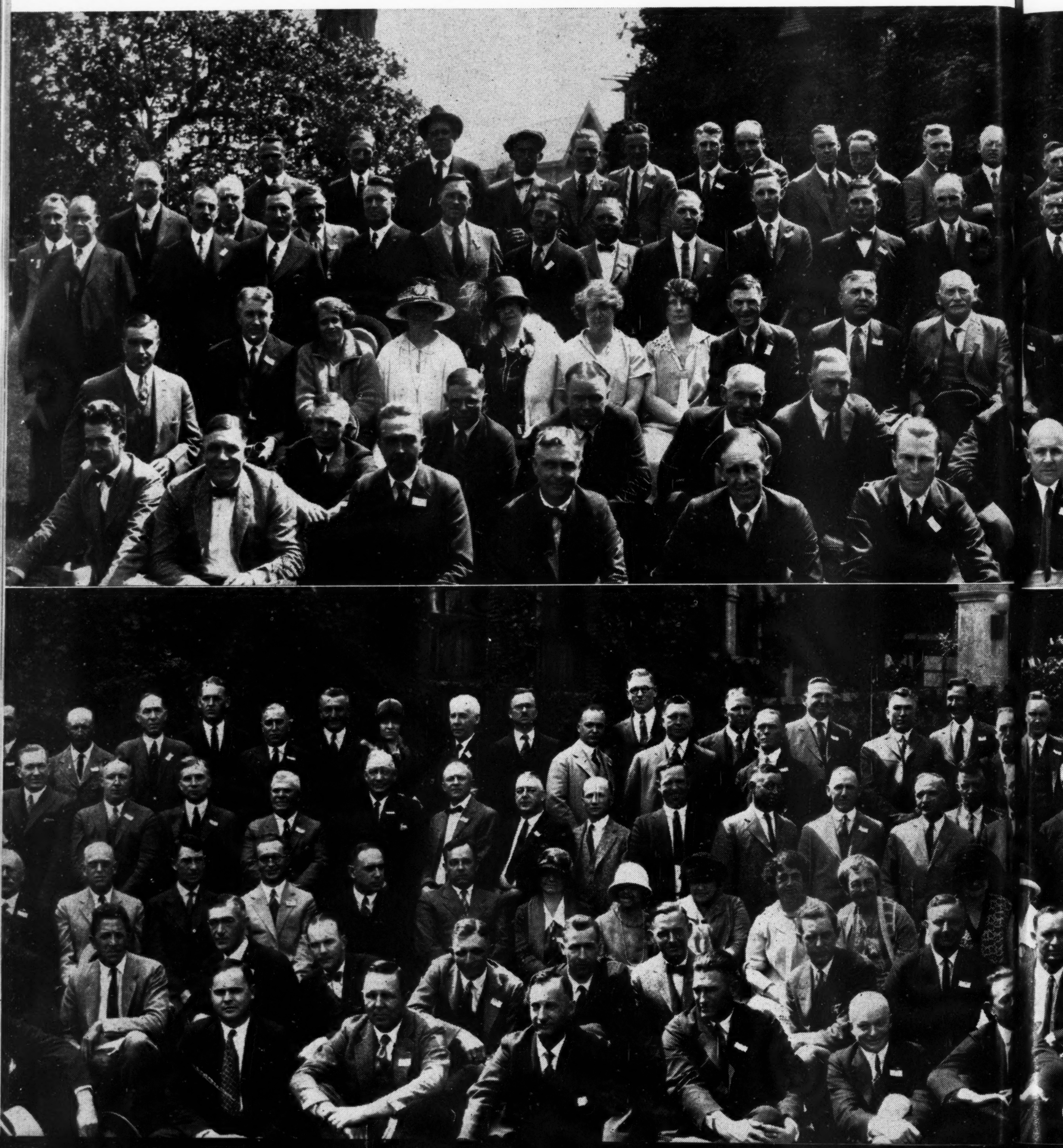


Fig. 17 (upper). Back view of life test machine for automatic pilots.

Fig. 18 (lower). Front view, automatic pilot light test machine.

HOW MANY CA

Here's a panoramic picture—in four parts—that will bring back memories to many a westerner and ex-westerner. When it was taken, E. L. Hall, who recently announced his retirement as vice president of Portland (Ore.) Gas & Coke Co., was president of the Pacific Coast Gas Assn. F. J. Shaefer, then general manager of Southern California Gas Co., Los Angeles, was vice president. Managing Director Clifford Johnstone was called "executive secretary" and D. G. Martin, now about to be re-elected to the post



N YOU NAME ?

for the umpteenth time, was treasurer. WESTERN GAS, the forerunner of GAS, was not yet born. Its first issue was still eight months away.

The place was the Arlington hotel in Santa Barbara, the city where PCGA convenes this month. The time was Sept. 15-19, 1924. The occasion was the 31st annual convention of the association.

HOW MANY CAN YOU NAME?

1. Drying With Gas-Fired Infra-Red Black Emitters

Last month GAS reported some recent developments in the utilization of gas in Great Britain. Further applications of the fuel, for industrial and domestic uses, are discussed in this two-part article.

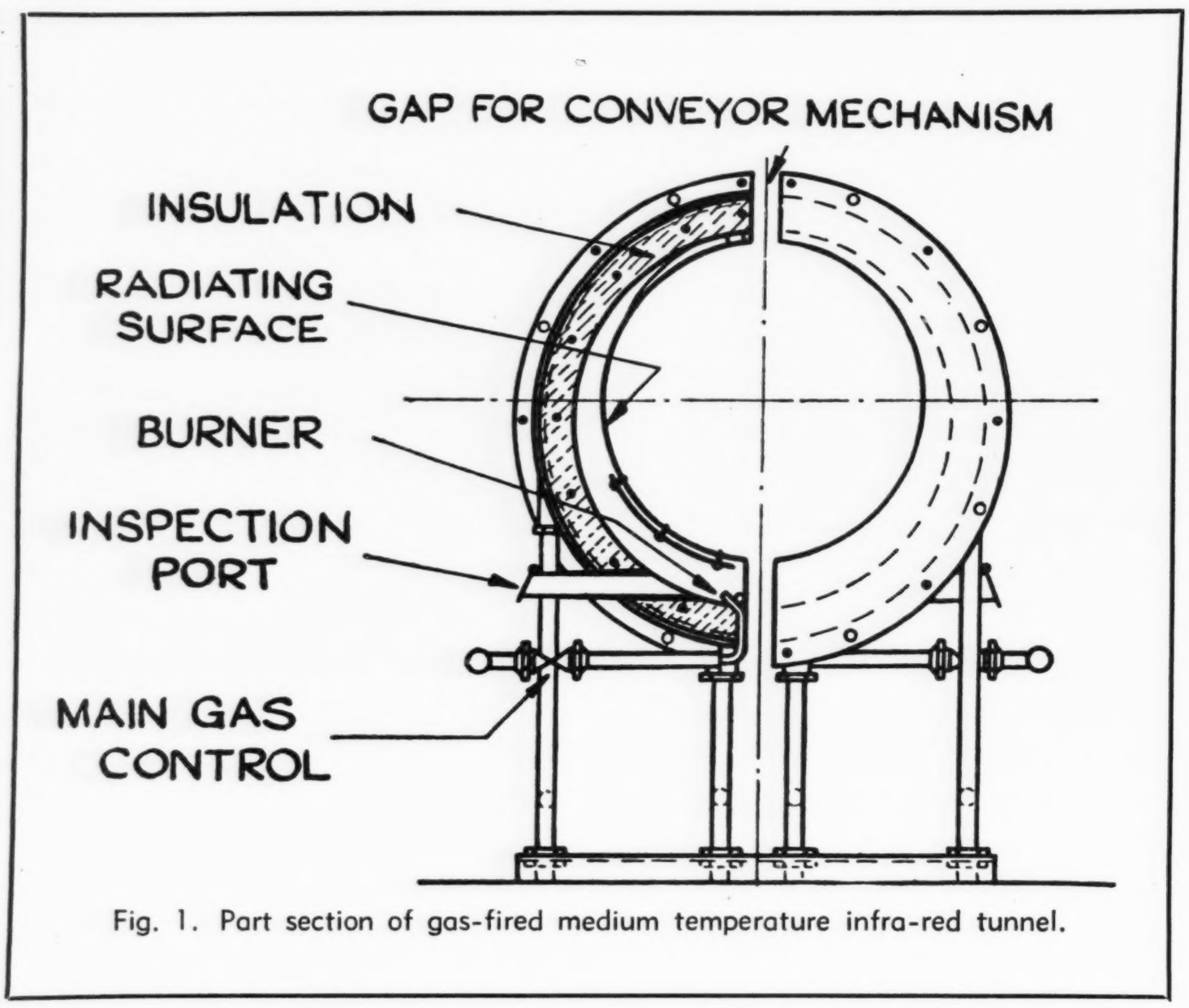


Fig. 1. Part section of gas-fired medium temperature infra-red tunnel.

THE practical problem involved in the application of infra-red to industrial drying processes is to produce radiation economically, and to ensure a reasonably uniform intensity of heat over the surface of the object under treatment, the energy waves being substantially absorbed by the surface upon which they fall. In addition, it is a great advantage to be able to adjust the intensity of radiation falling on the work, and with black emitters, complete flexibility and immediate adjustment over the whole practical working range is possible.

The intensity of radiation can be varied by the operation of a gas tap, which regulates the supply of gas to the burners; in fact, different temperatures can be maintained in various parts of the same drying tunnel, or series of panels, to give quick initial partial drying, and to complete the drying at a lower temperature, or vice versa, and can be readily and speedily adjusted to very fine limits.

Standard Tunnel Unit

A standard tunnel unit consists of two semi-cylindrical radiating surfaces, heated by enclosed gas burners. These units are manufactured in three sizes —2 ft, 3 ft and 4 ft diameters. The sections, which are 3 ft in length, may be bolted together to form a tunnel of any desired length. Each 3-ft section maintains its independent gas burners and controls, so that the radiation intensity can be adjusted along the length of the tunnel as previously mentioned. Any number of units can be controlled together, and automatic control can be fitted if desired. (See *Fig. 1.)*.

In order to meet the demand for tunnels of widely differing sections that can be used with maximum efficiency for special manufacturing processes, a flat panel unit has been evolved. (See *Fig 2.)*

Advantages

This standard unit is built up to special requirements, and possesses the advantage of great flexibility. It is manufactured in two sizes, 3 ft by 1½ ft and 2 ft by 1 ft, and the advantages of this type of tunnel may be summarized as follows:

1. Tapered combustion chamber, insuring correct distribution of heat and correct velocity of flue gases.
2. Flue outlets on face of emitter panel, maintaining high ambient temperature in working space.
3. Transmission of heat over face of panel maintained in equitable manner, and without the variation associated with a cast-iron panel and straight type combustion chamber.
4. The use of swaged mild steel panel, which makes for rigidity, and at the same time allows the fitting of thermocouples for pyrometer indicating equipment if desired.
5. Compact and robust in construction, but with minimum weight, allowing panels to be fitted at high levels without undue structural framing to carry the units.
6. Emitter panel insulated from main casing or sides, to prevent absorption of heat from the panel by the casing.
7. High efficiency of lagging and even heat distribution of panel ensures greater economy in gas consumption.

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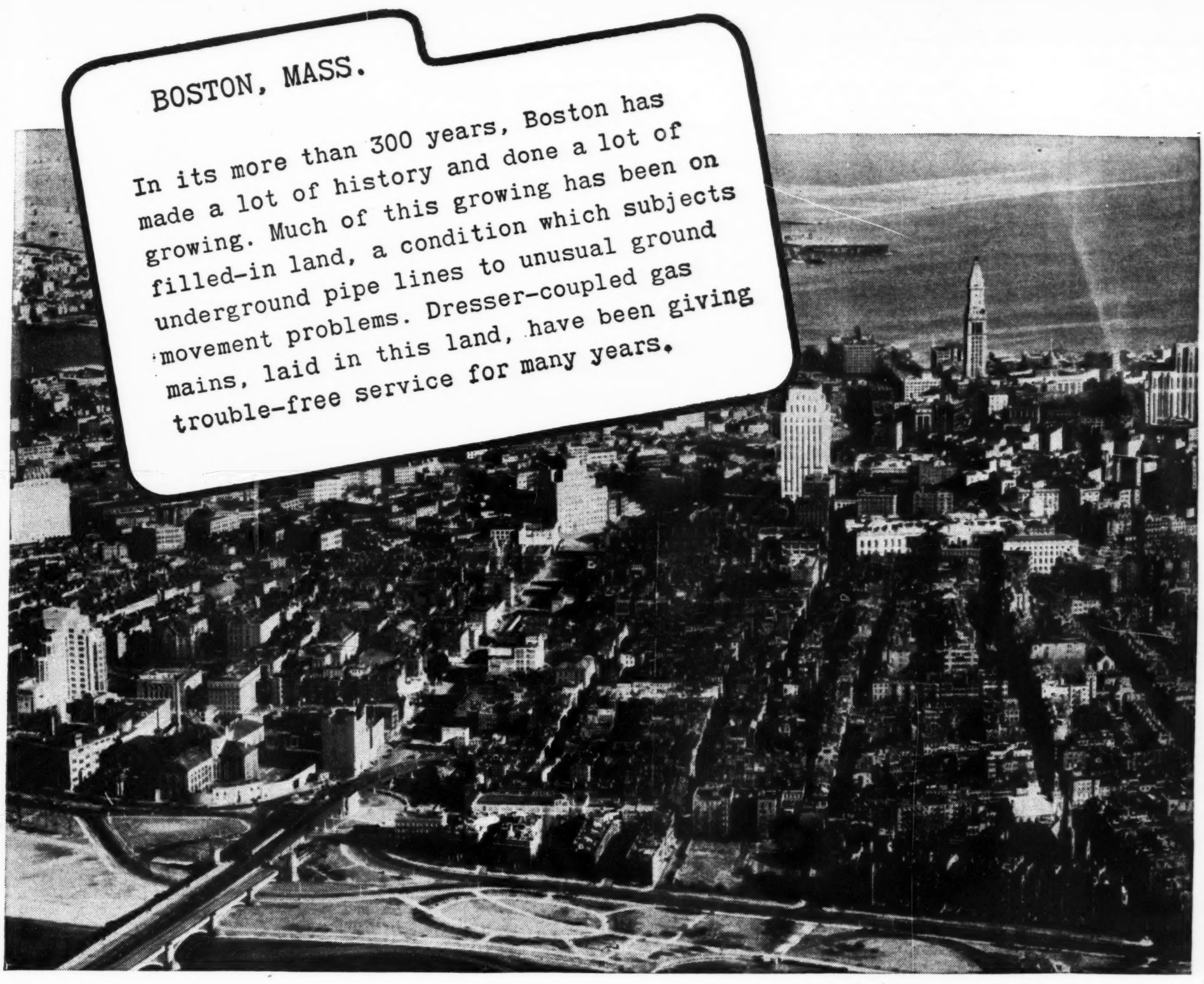
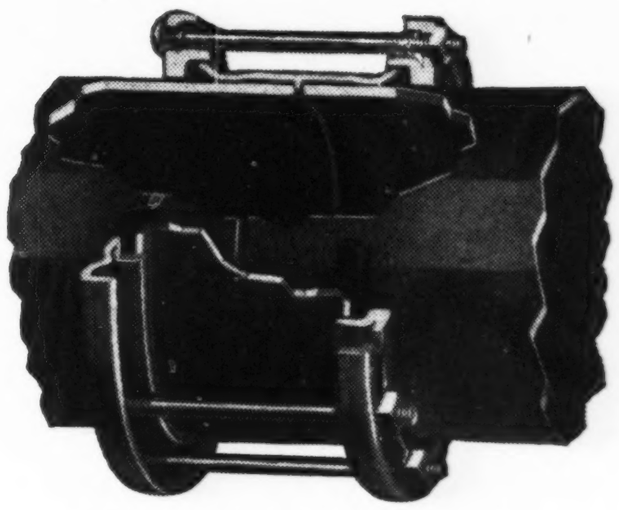

BOSTON, MASS.
In its more than 300 years, Boston has made a lot of history and done a lot of growing. Much of this growing has been on filled-in land, a condition which subjects underground pipe lines to unusual ground movement problems. Dresser-coupled gas mains, laid in this land, have been giving trouble-free service for many years.

HISTORY IS MADE UNDERGROUND, TOO



Gas mains write an impressive history of trouble-free service when they are joined "Flexible-Tight" with Dresser Couplings. Cushioned by the resilient Dresser gaskets against the stresses of vibration, expansion, contraction and earth settlement, such lines can be expected to set performance records.

The history includes an important chapter on economy. Factory-made Dresser Couplings can be installed by any labor, in any weather, even in cramped space. The only tool needed is a wrench. Installation moves fast, and backfilling can follow immediately.

You save on maintenance, too. Dresser dependability is proved on more than half a million miles of pipe. Write today for detailed information.

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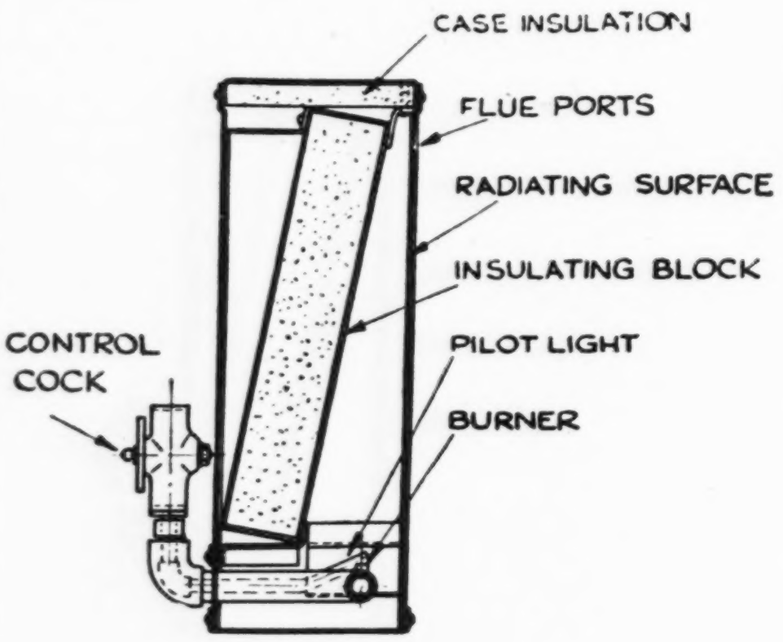


Fig. 2. Section through infra-red tunnel.

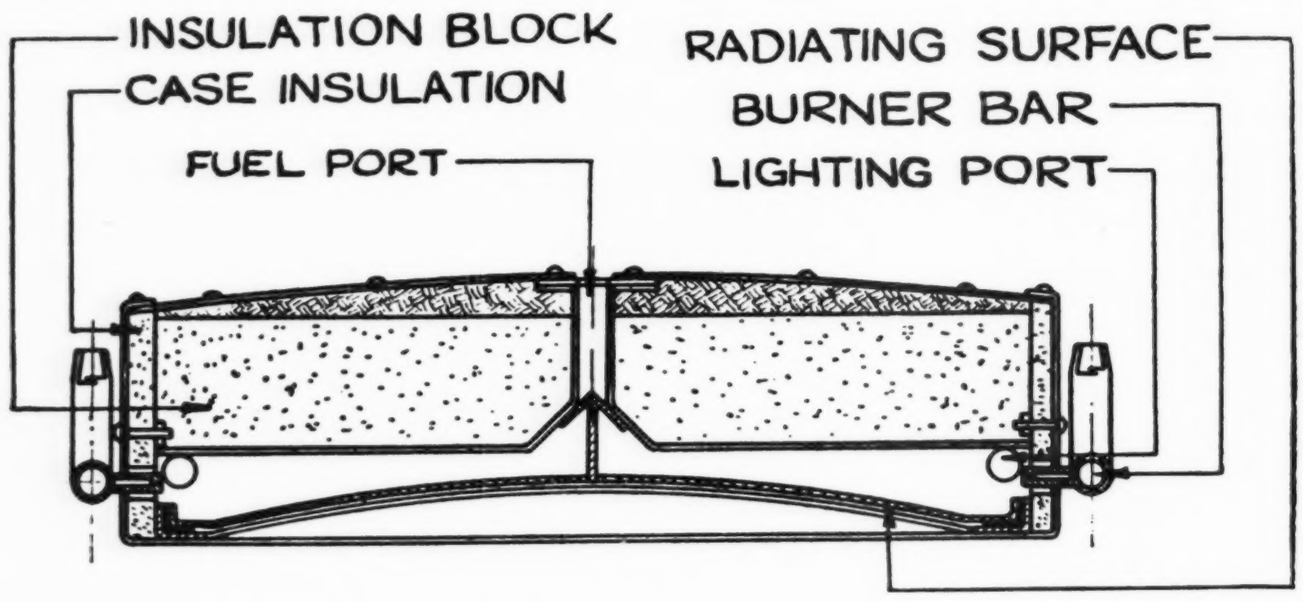


Fig. 3. Section through horizontal gas-fired infra-red panel.

Other Features

Other features of the flat panel type are the inclusion of low voltage (12-volt) spark ignition, in conjunction with solenoid gas valve. For example, a large battery of flat panels may be lighted from one switch. This is invaluable, and saves considerable time, especially if the battery of panels takes the form of a high, flat radiant working space. With remote lighting of panels (especially when fitted in inaccessible positions) it is necessary that indication of lighting is provided, and for this purpose the panels are fitted with heat detectors as a standard equipment. The detectors only operate in conjunction with the flue gases of the actual panel to which they are fitted, and are unaffected by the con-

NEW USES FOR GAS IN BRITAIN: 2. Toasters, Towel Dryeeer

BRITAIN has devised some interesting applications for gas, as was brought to light in the Caterers' exhibition in Manchester early this year.

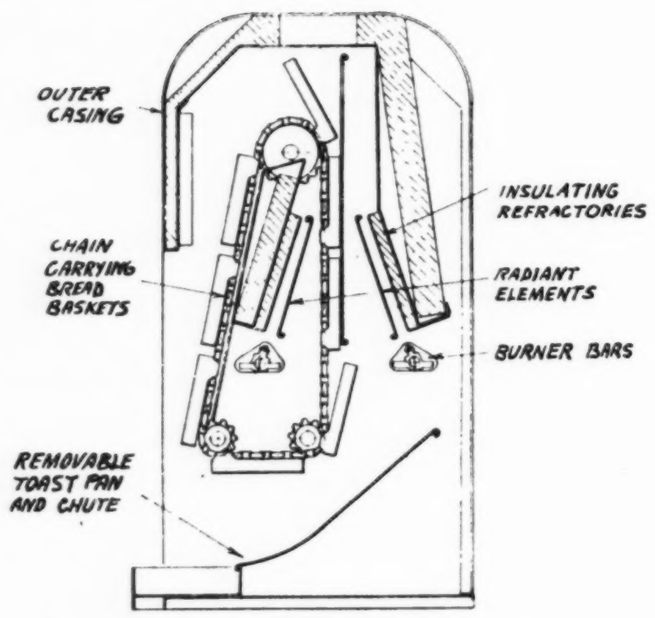
Among these newer items is a commercial gas toaster with the trade-name "Toast King." *(Fig. 1.)*

A continuous chain fitted with racks to carry the bread slices revolves continuously on sprockets driven by a fractional horsepower motor. In the event of electrical failure it is possible to operate the belt conveyor manually.

The sliced bread is fed on to the rack through the front of the machine where it is conditioned prior to testing by its upward passage on the outside of the radiant unit. The toast is then carried vertically downward between the radiants where it is uniformly treated. It continues in its path and is removed again from the front of the machine. The panels themselves were designed by Radiant Heating Ltd. and are of refractory material fitted with Bray industrial jets.

Toaster Output

The output of this toaster is 700 rounds per hour and the gas consumption is 40 cu ft per hour with gas



The "Toast King" is a new bread toaster having an output of 700 rounds per hour. Gas-fired, it is driven by an electric motor.

of calorific value 500. The lower compartment may be used as a storage cabinet or as a heated container. The toaster is made from sheet steel which is vitreous enamelled. Great care has been given to adequate insulation to conserve fuel and reduce operating costs.

Another new piece of equipment, for domestic as well as industrial use, is a gas-heated towel rail. *(Fig. 2.)* The domestic model is 3 ft 6 in. high and 3 ft 6 in. wide, and circulates warm water around the two heating pipes. There is a gas connection at the base right leg. A lighting hole just beneath the lower horizontal heating bar enables the burner to heat the water in the waterway. In this manner hot water is continuously circulated.

Industrial Type

The towel rail is fabricated from copper tube which is attractively nickel plated and then chromium plated. Its gas consumption is 1 cu ft per hour and it utilizes a Bray jet.

The industrial unit measures 6 ft by 6 ft and consumes 5 cu ft of gas per hour. In this case there are two bars at the top of the installation to be used for drying purposes and one at the bottom containing a tray which can be used to dry boots and shoes.

Obvious applications are in cloak rooms for drying towels and for drying outer clothing during wet weather. This has advantages for the summer season when the central heating system is turned off.

Greenhouse Heating

An enlarged variation of the principle used in the gas-heated towel rail has been developed to provide a new approach to greenhouse heating. *(Fig 3.)* Air is drawn from the outside

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dition of any other panel. They are insensitive to temperature below 400° F, and cannot give a false reading when the panel to which the detector is fitted is cold. Moreover, within 15 seconds of the gas becoming extinguished, the detectors show that combustion has ceased at that particular panel.

Horizontal Flat Panel

Another addition to this range of emitters is known as the horizontal flat panel, which provides radiant heat from a flat downward source, as there are numerous instances where top heat only is required for the treatment of flat objects passing through an emitter on a slat or belt-type conveyor. (See *Fig 3.)*

This panel incorporates the salient features of other emitters, e.g. low gas rate, even heat distribution over panel face, high efficiency insulation; sturdy construction, with panel temperature ranging from 400° to 650° F. Each panel may be independently controlled and provides means of temperature graduation throughout the length of the emitter.

Precise Control

The very rapid rates of heating achieved by these emitters require precise control of stoving times, and for this reason show great advantage with conveyor systems. For objects which have shielded surfaces, for example the internal surface of a box or can, the panel temperature may easily be adjusted so that the rate of heat transfer to the outside surface of the object by radiation will equal the rate at which heat is conducted through the object, thus ensuring even and complete stoving of such articles. It is one of the chief advantages of the gas-fired unit over other systems that a very wide range of temperatures can be obtained by a simple adjustment of the gas flow, while an even distribution of heat over the whole surface of the emitter is maintained.

There are many instances in which the emitter is used for industrial drying. These include the impregnation and baking of the insulating varnish on armatures, stators and field coils, and very successful installations of this type have been carried out for electric motor manufacturers. Emitters are also used for the curing and drying of feeding-bottle nipples and other synthetic rubber articles, both in this country and abroad, and they are also used for the drying of bismuth powders and bakelite powders.

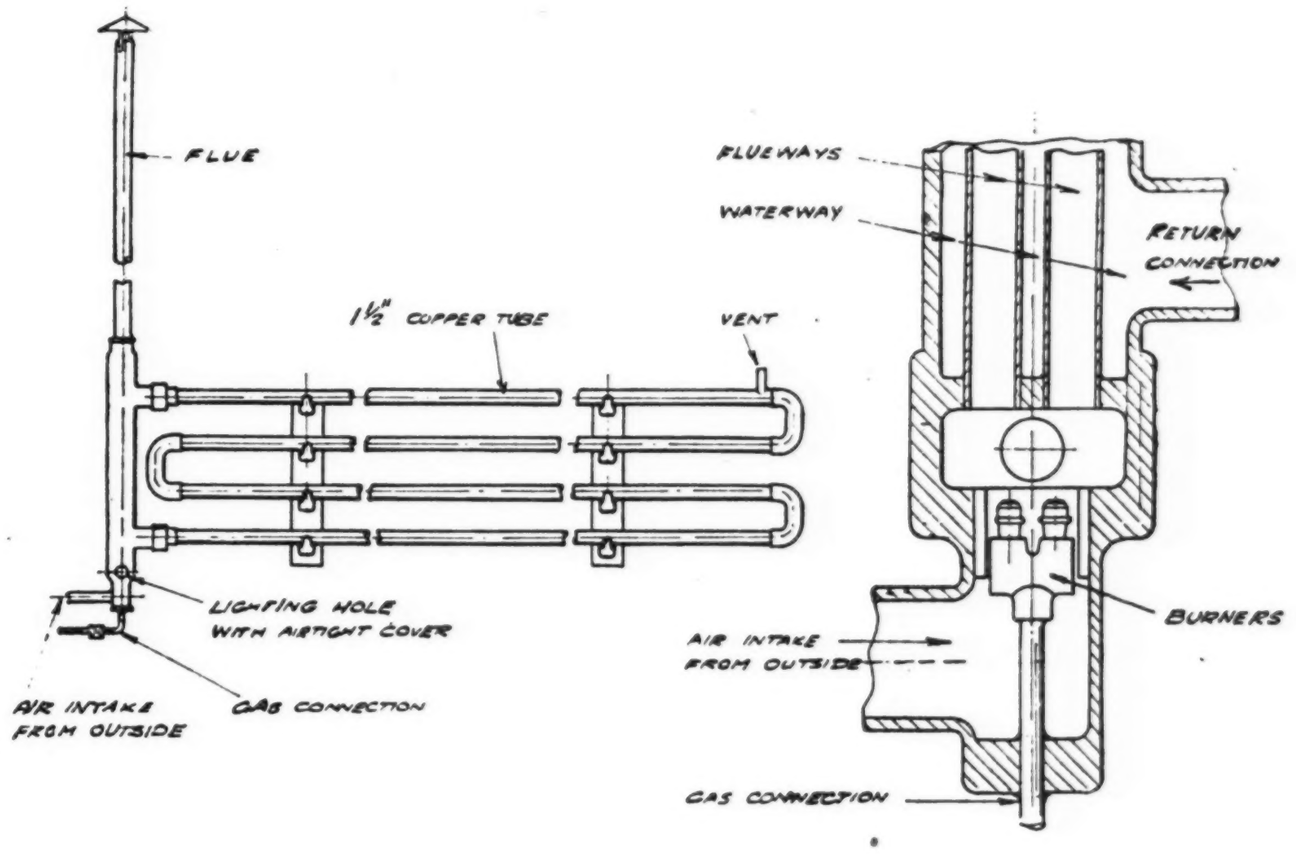
Gas Advantages

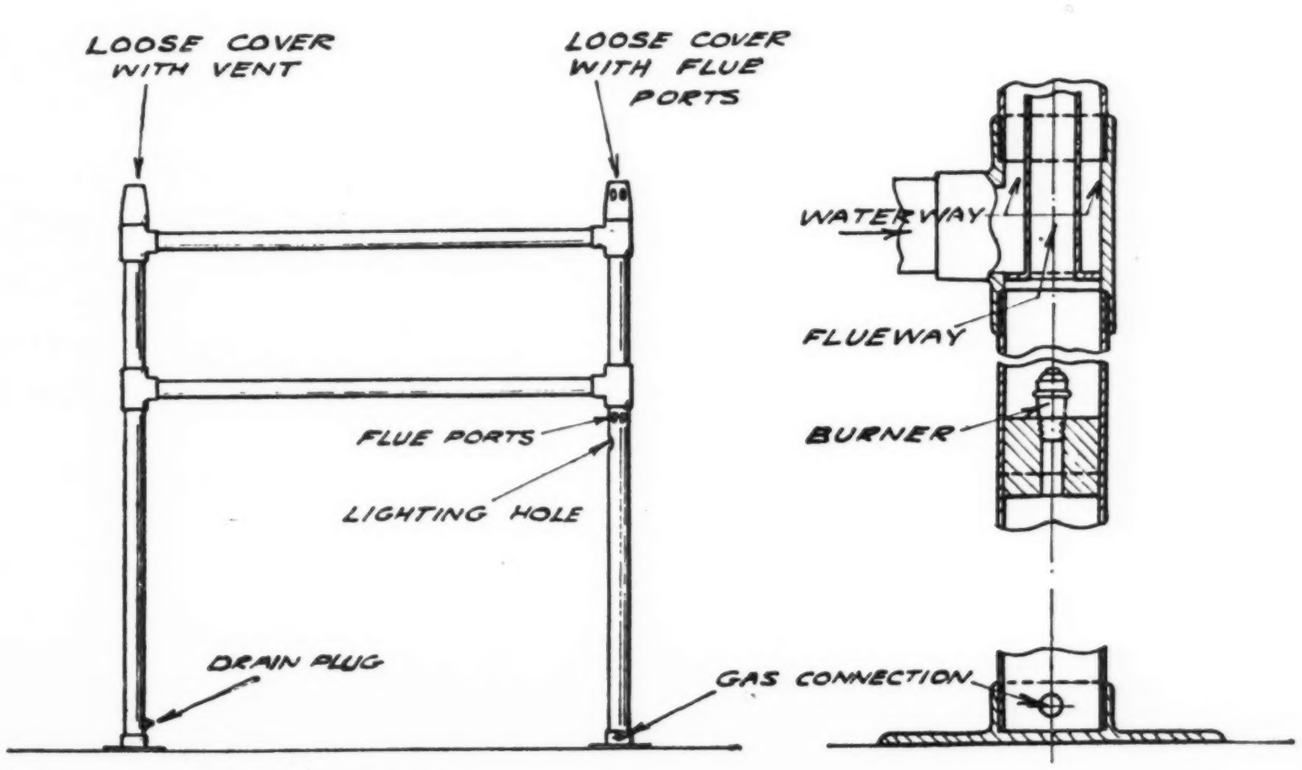
With this type of installation there are certain advantages inherent with the use of gas. Installation running and maintenance costs for gas-fired units are lower than in the case of other systems, and the emission spectrum is such that the effect on paint color is less marked. Complete uniformity of heat distribution is obtained, and the range of flux densities from a gas unit is much greater than that normally obtained by other means. In addition, it is easy to reduce the flue density steadily by turning down the gas.

...eenhouse Heaters

temperature, not from the interior of the greenhouse, and after being used during the combustion process the products of combustion pass out through a flue to the exterior of the greenhouse. There is a gas inlet underneath the waterway or heat exchanger which is heated by two gas jets rated at 5 cu ft per hour. Once again, the apparatus is fabricated from 1½-in. copper tube.

"We have frequently heard of the increased usage of gas on smallholdings and on the farm and this greenhouse heater provides a further example of the versatility of gas as a fuel."





Warm water circulated through heating pipes is the method adopted for towel warming (Fig. 2, at left) and greenhouse heating (Fig. 3, above). Two models are made for the towel drying operation, one for domestic use and a larger size for industrial purposes. For greenhouse use, air is drawn from the outside and the products of combustion also pass to the outside.

Better Utilization of Metallic Circuits in

REMOTE CONTROL AND TELEMETERING

By W. A. LaVIOLETTE

A discussion of the better utilization of metallic circuits for remote control and telemetering can be made more comprehensive by an analysis of the elements of design which make up the final plan. The ideas and devices which are to be described have been used successfully in circuits involving an air line distance of approximately 50 miles between the receiving and transmitting stations. The electrical impulses were required to travel a distance of 100 miles to complete the circuit. A survey into the field of the use of telemetering and remote control shows that more than 90% of the systems are used within a circuit distance of less than 50 miles. When longer distances are involved it is more practical to use carried equipment in some form superimposed onto either existing telephone channels or high voltage electrical transmission lines.

The electrical nature of telemetering implies a circuit interconnecting the transmitter and the receiver. The circuit provided can determine the success or failure of an otherwise perfectly good telemetering and remote control system, and consideration with regard to its selection and maintenance is fully as important as the instruments involved.

Time does not permit going into the detail and specifications of the devices used, but a general description and function of the individual units will give a more comprehensive picture as to the ultimate result. The plans and ideas which are to be suggested represent nothing new in the electrical field but merely represent a combination of tried, commercially available, units grouped together to accomplish the desired result.

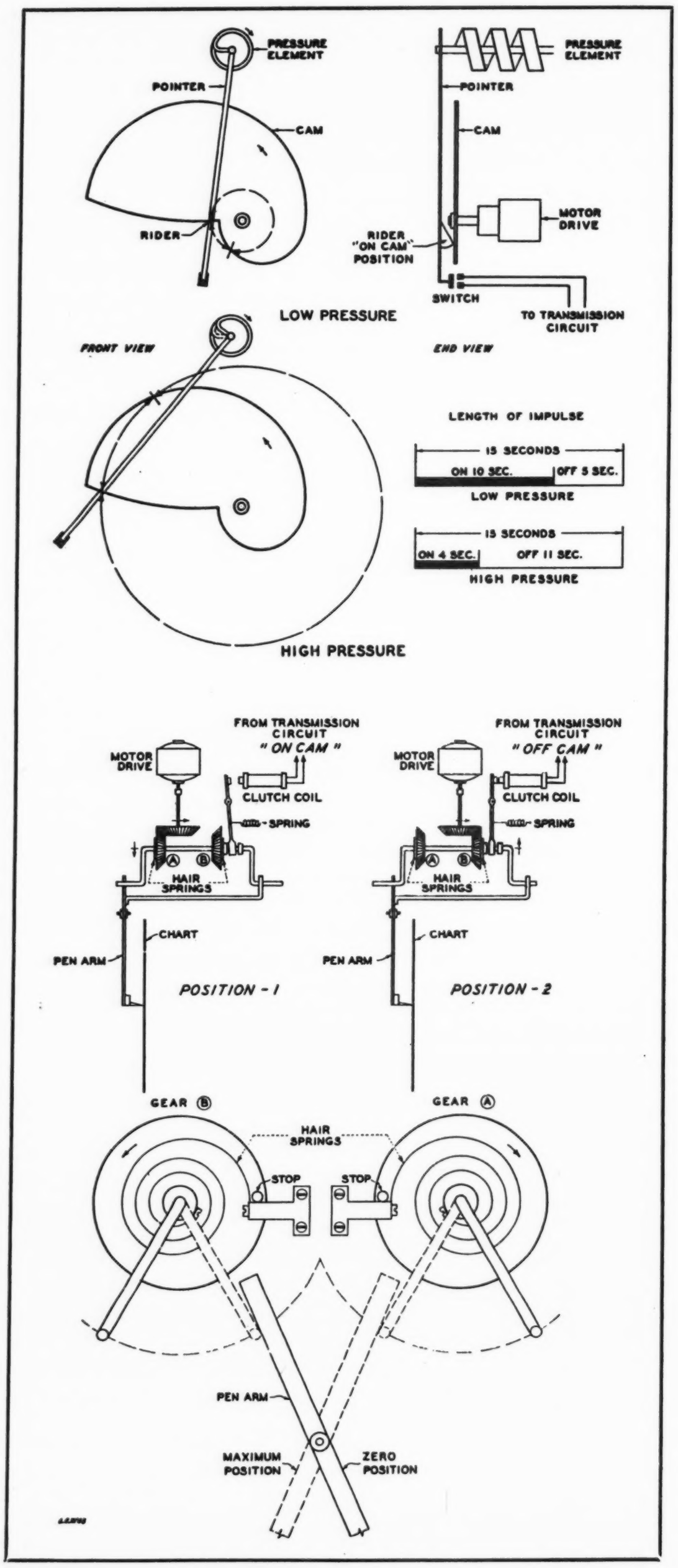
It is assumed that the reader is familiar with the principle of a time impulse type of telemetering system.[1] A brief reference to *Fig. 1* will refresh memories in reference to the operation of the transmitter. Its essential function is to vary the length of an electrical impulse in relation to the magnitude of the primary information, such as flow or pressure.

Fig. 2 shows the general operation of the receiver. The elements of a receiver consist of an accurate timing device to drive the gearing and a clutch coil which produces a mechanical shifting effect within the gearing to drive and position the pen arm either up or down the chart as dictated by the length of impulse received from the transmitter. The clutch coil receives its impulse from the transmitter and operates in accordance with the definite time cycle as established by it, which is divided into two-time periods—the "OFF-CAM" and the "ON-CAM." During the on-cam interval the switch at the transmitter is open and during the off-cam period the switch is closed.

A simple telemetering circuit is illustrated in *Fig. 3*, showing the arrangement of the transmitter and receiver in which the transmitter alternately closes the switch at the remote point, causing the circuit to be completed at the

[1]For operational details, see Pacific Coast Gas Assn. proceedings, 1945, Vol. 36, p. 96; also *GAS*, Sept., 1945, p. 21. The article presented here was delivered by the author-engineer for Pacific Gas & Electric Co., San Francisco, at the PCGA distribution conference in Los Angeles last April.

Figs. 1 and 2 appear at right.



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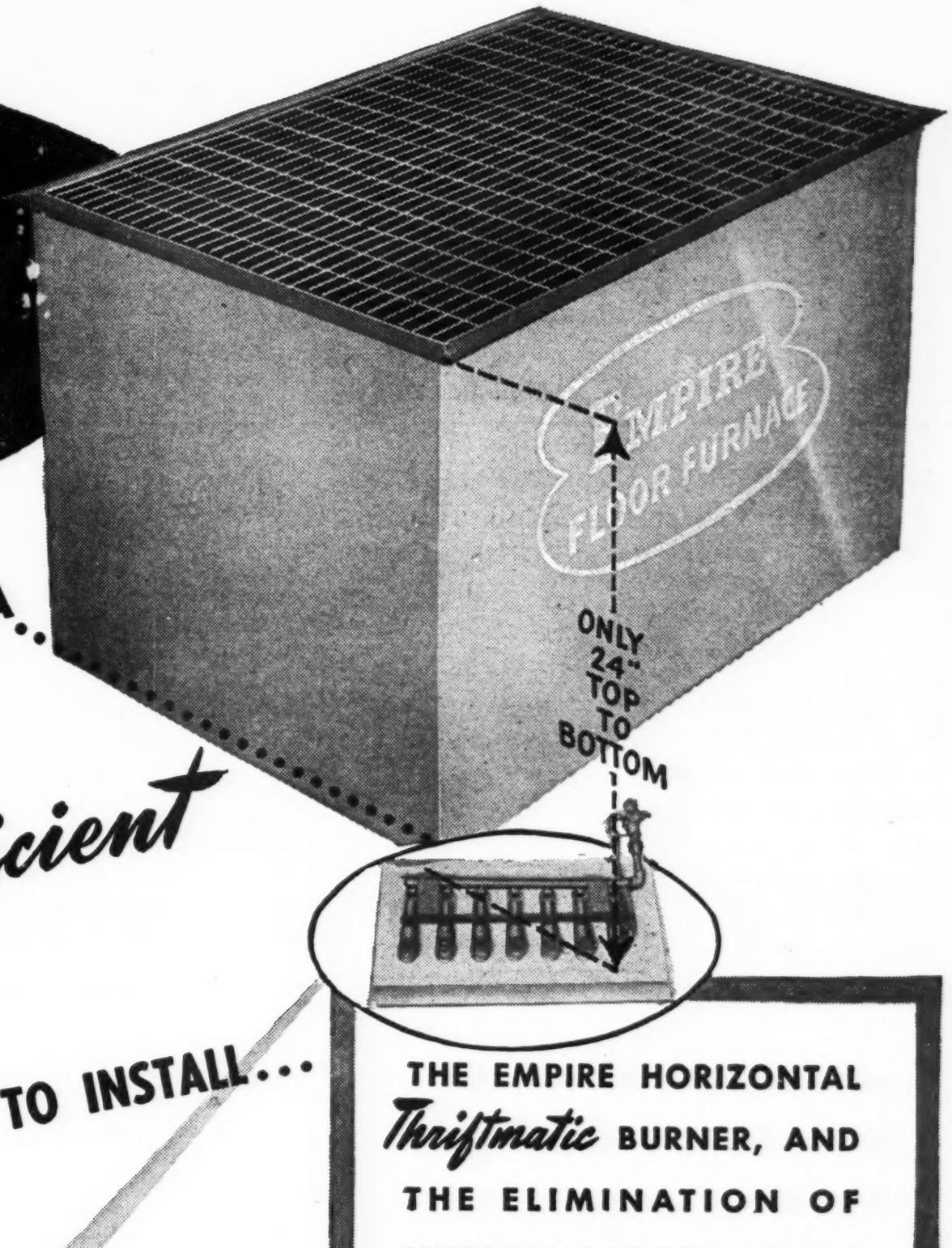

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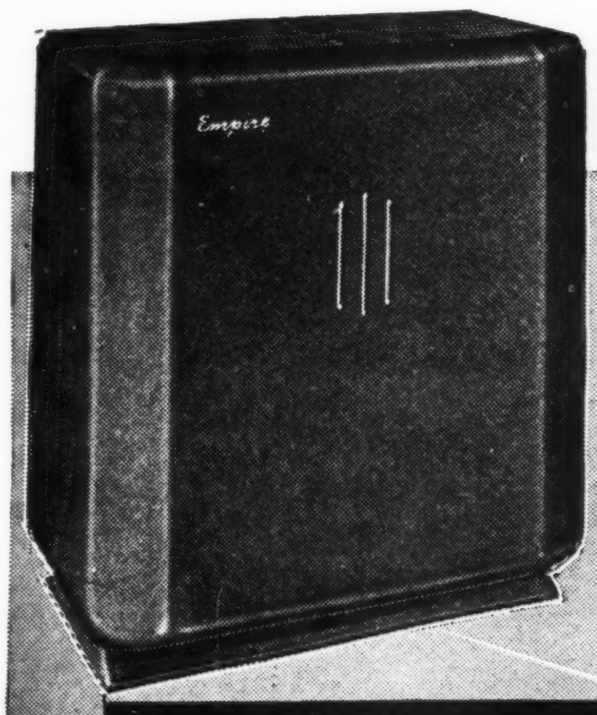

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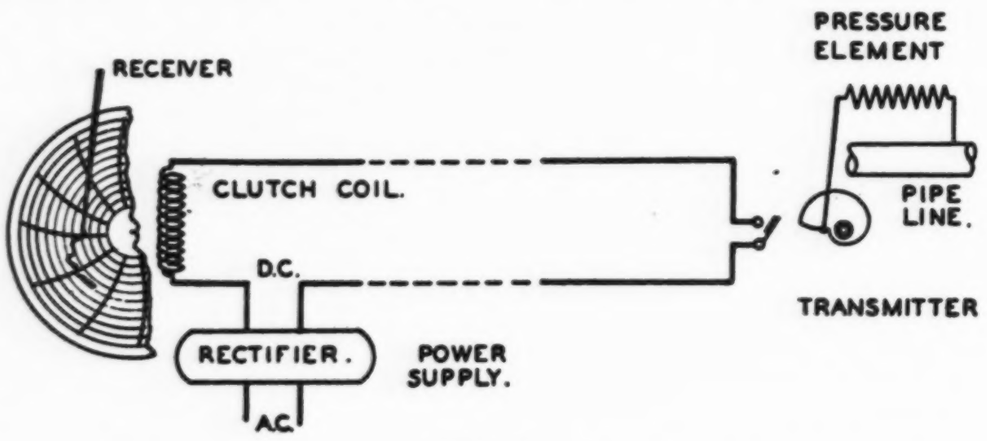

Fig. 3

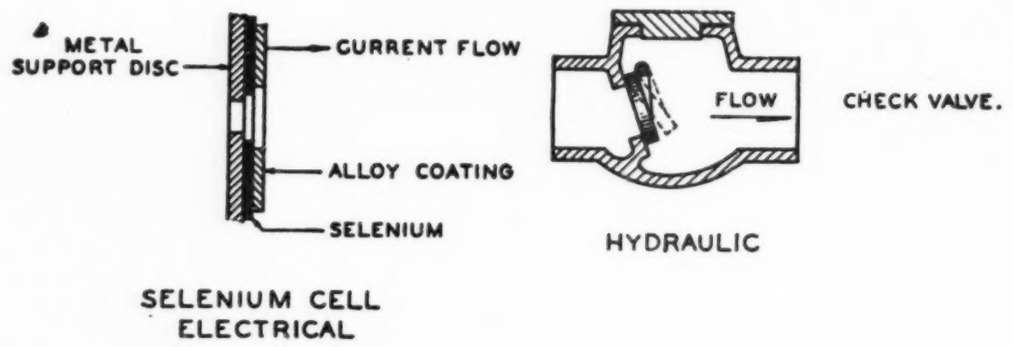

Fig. 4

clutch coil in the receiver. The source of current is illustrated as coming from a rectifier, classifying the system as a d-c type.

Does 14 Jobs

The plan is to show how this simple, single-function telemetering system can be expanded to perform 14 separate and distinct functions of telemetering and remote control by the combination of commercially available devices. It is assumed that the metallic circuit which may be "leased pair" has been rented from the local communication company or it may have been specially constructed for the particular telemetering and remote control problem. As indicated, this is to be a direct current system and because of the nature of the electrical impulses, positive and negative polarites originate from the rectifier. Before expanding our problem from a simple telemeter circuit involving one receiver and one transmitter, let us set up the requirements of a typical remotely controlled valve station. Before explaining the details of the arrangement, a tabulation of the many possible control and telemetering functions will be in order.

1. Have recordings of both the upstream and downstream pressures of a remote valve station transmitted to the plant.
2. Have either pressure readable on the large scale of an indicating telemeter receiver.
3. By the use of the indicating receiver alarm points, make adjustments to indicate the desired pressure limit of either the upstream or downstream pressure.
4. Have the main valve remotely positioned to any degree of opening by the operation of a manually manipulated switch.
5. Have facilities whereby the indicating receiver can be connected to the downstream side and adjusted to control a desired band of pressure by positioning a switch to the "automatic" setting to make the remote valve follow a desired pressure track.
6. Introduce time-delay relays so that if any impulse should persist on the line for a period longer than the setting, the valve control would be disconnected and further movement prevented.
7. By a simple push button, transfer the remote end from "control" to "telemetering," thus removing the valve from normally being connected to the control circuit to reduce the possibility of any transient impulses from repositioning the valve.
8. Arrange the time-delay relays to prevent any violent action or over-control of the valve when operated by the "automatic" system.
9. Have a signal to the plant indicate any failure of power at the remote end which would prevent the operation of the main valve.
10. Arrange the alarm system to show a light and ring a bell and have the wiring arranged so that it would be impossible for the operator to leave the alarm circuit open.
11. Arrange a pen-lifting device in the recorder receiver which would lift the pen from the chart during the period of valve operation. The purpose of this is to prevent a congested chart which would result if there were many switching operations.
12. Provide connection to the alarm bell which would ring in the event of a failure of any vacuum tube or other part of the indicating receiver during the period when it is connected to automatic control.

The entire plan of telemetering and remote control is based on the use of dry-type selenium units of the full-wave and half-wave design. The rectifier unit, as well as the half-wave element, is made up of a series of cells.

Disk

Each cell consists of a metal disk, on one side of which there is a thin layer of selenium. An alloy coating is sprayed over the selenium *(Fig. 4)*. The result is a cell through which current flows freely from selenium to the alloy coating when voltage is applied, but with a very high resistance to current flow from the alloy to selenium. Thus, with an alternating current applied to the proper assembly of cells, the output is essentially uni-directional or direct current. The metal back plate serves only to support the selenium layer and takes no part in rectification. The life of these units is practically unlimited. They may be likened functionally to a check valve in a fluid piping system. From this conception it is understood how the rectifier units could be arranged to permit the flow in one direction and block it off in the other.

In the control circuit the selenium units are arranged to respond and permit the flow of direct current, depending upon its polarity. That is, by placing the units in the line in opposite position to each other, they can be made to accept or reject a flow of current and thus permit only certain desired functions to be performed.

A hydraulic analogy using check valves is illustrated in *Fig. 5*. Referring

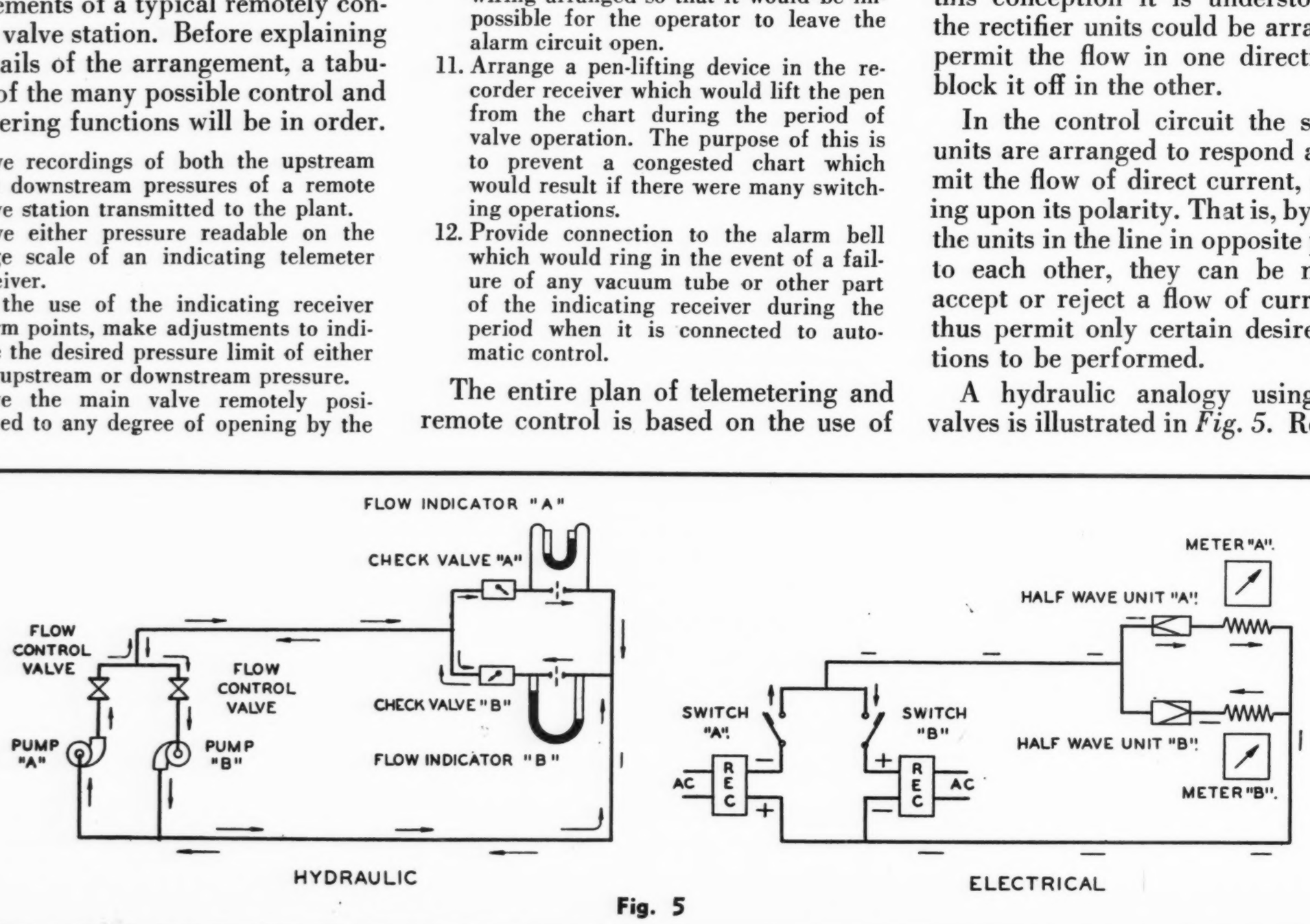

Fig. 5

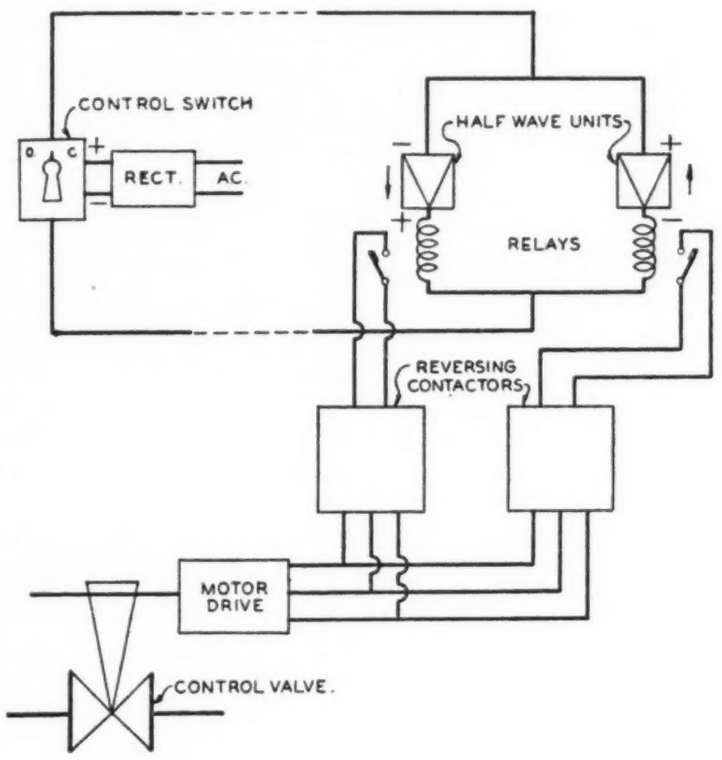

Fig. 6

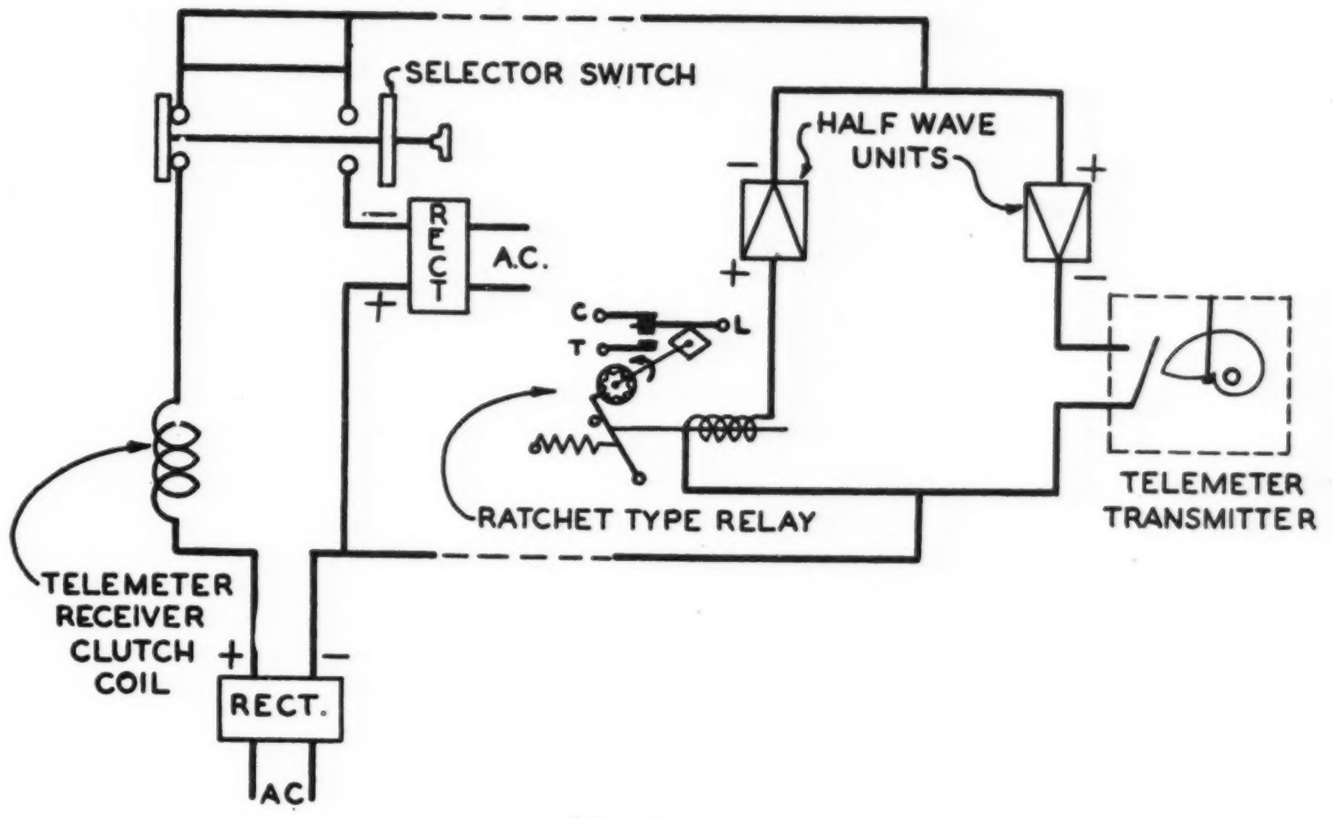

Fig. 7

to the figure, assuming that pump "A" is operating and delivering liquid through the flow control valve upwardly into the piping system, check valve "A" then would be receptive to permit the flow of fluid to continue the circuit, an indication of flow would be given by a differential gauge or flow indicator across an orifice, and the fluid then would continue back to the suction of the pump, completing the circuit. If pump "B" is operated and the liquid is caused to move in a downward direction along the piping system, it would then pass through the orifice meter indicating a flow. Check valve "B" would permit its flow; blocking it off would be check valve "A." The fluid then would continue its passage through check valve "B" and around the piping back to the control valve into the suction of the pump, completing the circuit. It can thus be seen that flow will occur across one indicator or the other, depending upon the responsiveness of the check valves.

Flow Analogy

The electrical flow analogy of a similar circuit is also illustrated in *Fig. 5.* Assuming that the line is fed from two rectifiers and the rectifiers are so arranged that if switch "A" is closed, negative polarity will flow upward through the line and continue to flow through the half-wave unit marked "A" which is receptive to flow, and continue along the circuit through meter "A," indicating a flow back along the circuit to the positive pole of the rectifier, thus completing the circuit. If switch "B" is closed the current will flow from the negative side of the rectifier along the line through meter "B" and the half-wave selenium unit "B," which is turned in such a direction that it offers very low resistance to the flow of the current, while the half-wave selenium unit "A" is turned such that its resistance to flow in the left hand direction is very high. The current then would continue to flow through half-wave unit "B" back along the line to the control switch, which has been closed, into the positive side of the rectifier, thus completing the circuit.

The value of resistance in the reverse direction (when the rectifier is used as a blocking valve) is in the ratio of 100 to 8000 ohms.

By substituting the element marked "Meter A" and "Meter B" in the previous diagram with relays which in turn would operate a reversing contactor, it is possible to achieve the positioning of a valve from a remote point. By referring to *Fig. 6,* instead of the two switches previously described, the control switch is a conventional drum type which might have a pistol grip handle. By rotating it partly either to the left or to the right, the desired polarity can be arranged to go out over the line. The reversing contactors are devices which when positioned will cause the motor of the valve drive to rotate in one direction or the other, depending upon which of the contactors is energized by the relays.

The direction in which the valve plug will travel is determined by the polarity received over the control wires. That is, if a positive impulse is sent out from the plant, the half-wave rectifier unit, which is set up to pass in the positive direction, will permit the direct current to flow through the relay of the contactor, closing the proper circuit which in turn will cause the valve plug to move. If a negative impulse is sent out, the valve will proceed to move in a closing direction.

Remote Switching

Switching at the remote point can also be achieved by the use of half-wave units, *Fig. 7.* At the plant end is located a selector switch which, when pushed, will interrupt the downstream telemeter receiver circuit for just a moment, putting over the line a negative impulse that is accepted by a half-wave unit at the remote point, causing the current to flow through the coil of a ratchet type relay. The mechanical elements of the ratchet type relay are such that upon the receipt of each succeeding impulse, a ratchet wheel is caused to revolve and advance one tooth causing a cam, which is on the opposite end of the ratchet shaft, to alternately position the blade of a switch to either of two positions. As illustrated, the normal flow of current from the rectifier is from the negative side along the line and through the telemeter transmitter, which is operating continuously; out through the half-wave unit, back out along the line through the closed member of the selector switch, proceeding through the clutch coil back to the positive side of the rectifier, thus completing the circuit. When the selector switch is closed, negative current will flow out over the line and be received by the half-wave unit which will permit current to flow through the coil of the ratcheted relay, causing it to rotate and advance one tooth of the ratchet wheel, out across the line back to the positive side of the selector rectifier unit.

Digressing for a moment from the design elements of a remotely con-

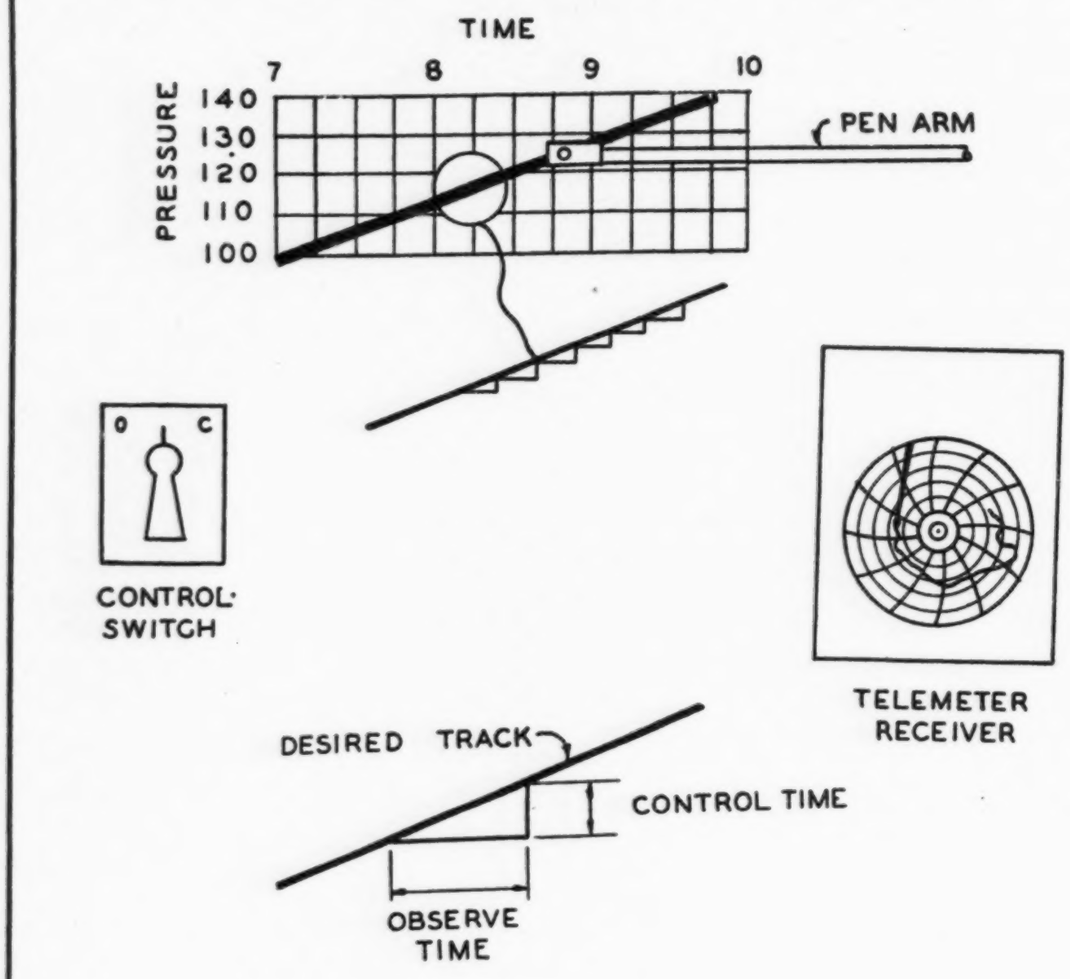

Fig. 8

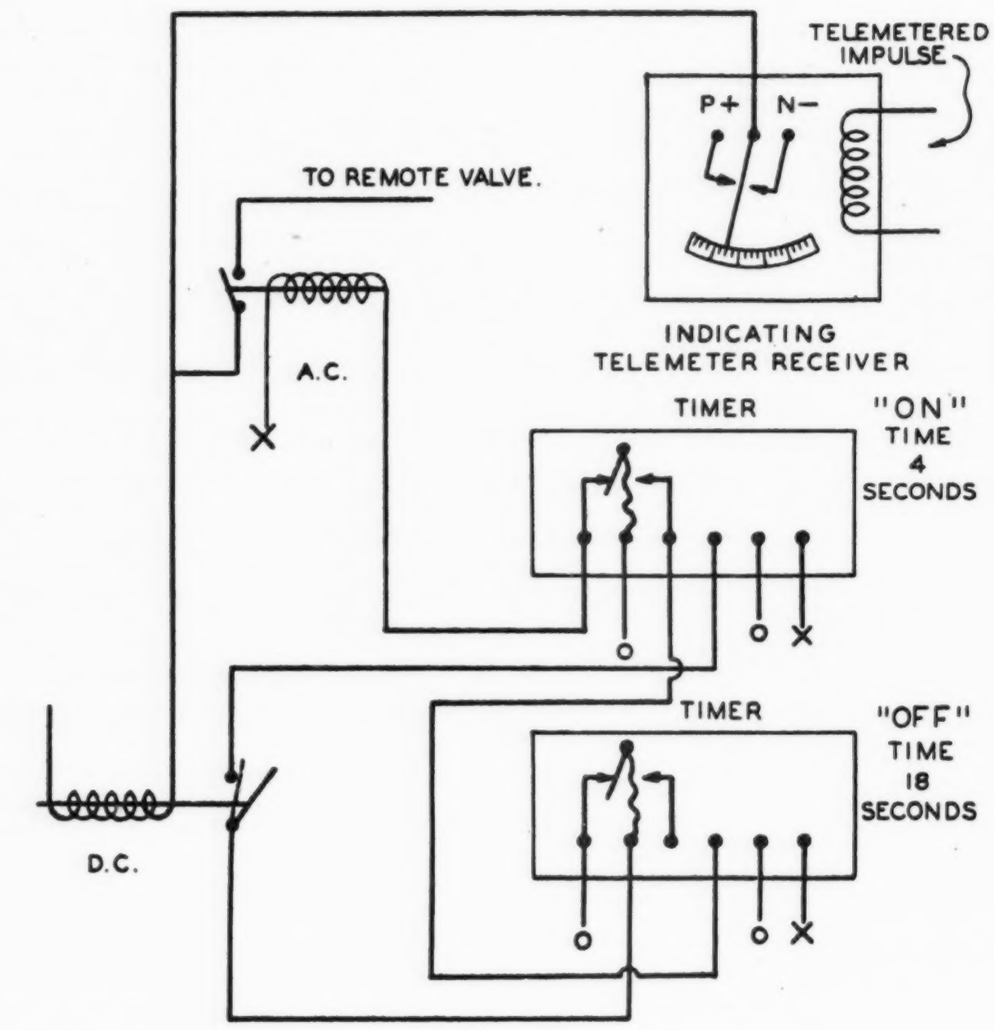

Fig. 9

trolled station, let us analyze the thinking and the steps taken by an operator when he desires to follow a predetermined pressure track. In the upper left hand corner of *Fig. 8* is an enlarged section of a chart. Assume that a desired pressure gradient has been set up such that for a specific load condition it is required that the pressure be increased from one level to another. The telemeter receiver, which records the pressure condition at the remote point, has its transmitter connected to the downstream side of the control valve. Consider also the problem wherein it is desired to maintain a constant pressure at some particular level.

Operational Procedure

The operational procedures would be somewhat as follows:

Having observed that the telemeter receiver has indicated a deviation from the desired pressure level, the operator would then position his control switch to bring the pressure level back to the desired point. Experience with a particular installation will soon dictate the degree of responsiveness of the remote control valve. Usually the control switch is held in position for a period varying from 3 to 7 seconds in our average type of remote control installation.

Other elements which are inherent in a long distance gas transmission line enter into the length of control period which should be used at any single positioning of the valve. In reality, a magnification of the control line drawn would show a series of steps which could be divided into two elements, the length of time that is used in making the observation and the length of time in which controlling or positioning is actually taking place.

Review

Reviewing this procedure, the operator first observed the deviation from the desired track, then instituted a control period to either open or close the valve, depending on which side the recorded pressure indicated. Before the operator attempts his second positioning he waits a period of time at least equal to a complete cycle of the pressure transmitter cam, which is 15 seconds. When he does make a change, he does it in small increments, always pausing long enough for his record to come back before proceeding again.

To stimulate this action automatically, we have coupled together two electronic time delay units into a pulsing system. These time delay relay units are of the electronic type which have no moving parts, such as clocks, etc., but are of very simple design. Their operation depends upon the well-known ability of a capacitor to store electric energy. By slowly dissipating this energy through a resistor, time will be consumed. *Fig. 9* illustrates a system in which two timing units are used to simulate the action of the operator automatically. Each unit has for external control a single pole, double throw, micro-switch. When the initiating circuit is closed in the unit, timing starts and length of time elapsed is determined by a potentiometer.

Two units are connected together in a pulsing system. The first unit controls the length of time the impulse current is on the line, and is adjustable from .6 to 12 seconds. The second unit controls the off period and has a range of 3 to 60 seconds. These relays are connected in tandem, so that after the "ON time" has elapsed the control impulse goes off the line and the "OFF time" unit is triggered. Thus they keep chasing themselves around in a continuous cycle.

Sequence of Events

Reviewing the actual sequence of events in this automatic system, let us assume that the telemetered impulse from the remote point has indicated a dropping of pressure. By the use of an indicating telemeter receiver with alarm contacts it is possible to convey the desired polarity over the line.

As indicated in the diagram, with lowering pressure positive polarity would be caused to travel over the line to the remote valve. At the same time a direct current relay is also energized. As can be seen from the circuit diagram the relay marked a-c, which is actuated by 110 volts alternating current, keeps its contact normally closed. Following the circuit through the first timer it can be seen that the circuit is completed through its micro switch. But when the d-c relay is closed the first timer is put into motion and after a period of, let us say, 4 seconds, the micro switch contacts will open, causing the current to the remote valve to be interrupted. The blade of this same

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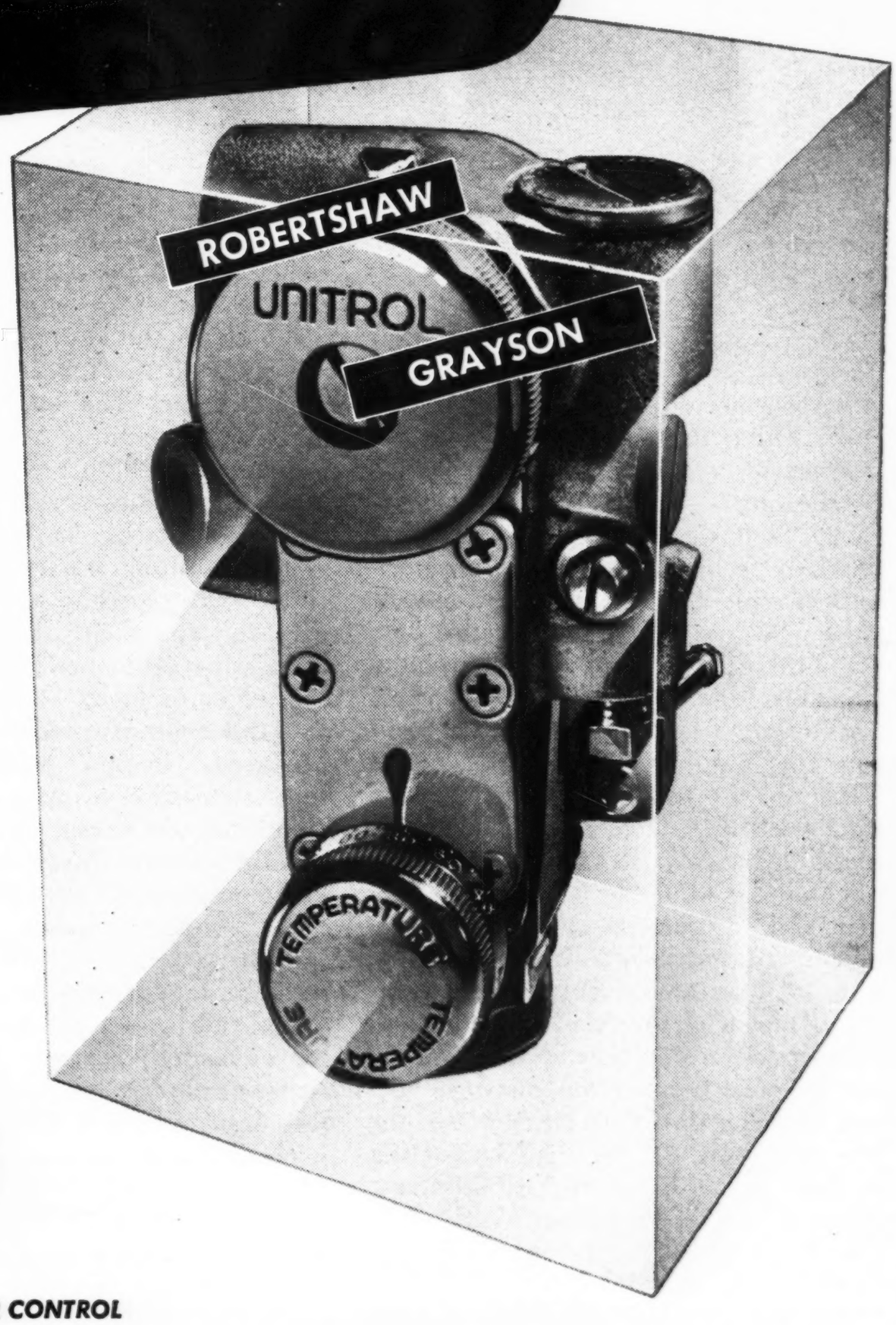

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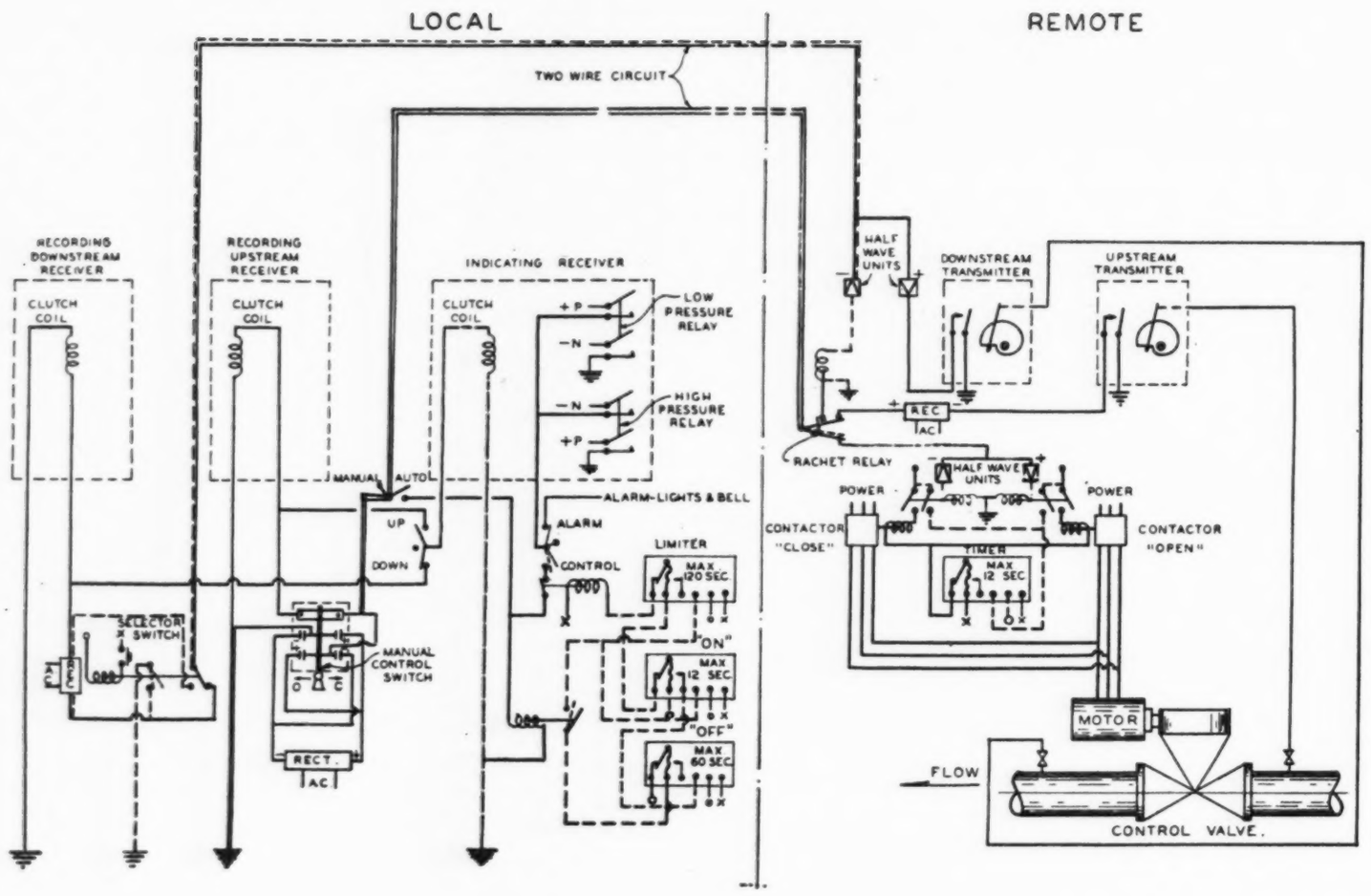


Fig. 10

switch moving to the right closes a contact which will put the second timer into operation.

Microswitch Open

After a period of, let us say, 18 seconds, which time will be sufficient for the remote transmitter cam to make one revolution of 15 seconds, its microswitch will open permitting the first timer to go back into its original position, closing the circuit to the remote valve and giving it another pulse of a 4-second period. This cycling is continued as long as the indicator contacts are closed. When the condition of pressure has been rectified to the desired level, the d-c relay will open and the timers will be put to rest. Conversely, if the pressure were too high, a negative impulse would be put over the line. The timing units would control the pulsing regardless of direction of motion of the remote valve. The indicating telemeter receiver has contacts in it of the electronic type so that there is no physical connection between the pen arm and the control element of the pressure limit pointer. All contacting is done through the use of auxiliary relays which are actuated by the conditions produced in an electronic circuit.

All the elements which have been previously described are shown in combination of *Fig. 10*. Certain liberties have been taken with the actual electric circuit but all the principles have been retained and are illustrated in proper relationship to each other. In the left hand portion of the diagram the units which are located at the local station are shown and in the right hand side are the elements which are installed at the remote station. The essential elements consist of a 2-pen telemetering recorder which is normally connected, one unit to the downstream side and the other to the upstream side of the remote valve. The indicating receiver may, by the manipulation of a switch, be connected in parallel either to the upstream or downstream telemeter recorder.

The pointers of the indicating receiver may be set to any limit to indicate and sound an alarm and light a light when either of the positions of the upper or lower limits are reached. For this type of operation a switch is positioned in the "alarm" direction. Further features of these alarm circuits, which are not shown, are that it is impossible to leave the alarm switch in the "off" position, by the use of extra contacts which are in the relays of the indicating receiver. When the contact is made a red light shines and a bell rings; the operator, by throwing the alarm switch off, will disconnect the bell, but the light remains lit as long as the contact persists. When the condition is cleared and the alarm relays go back to normal the bell will again ring, causing the operator to position the switch back to its original setting, thus making it receptive for the next operation.

Manual Positioning

When it is desired to position the remote valve manually, the selector switch button is pressed, causing negative polarity to go out over the line. It will pass through the proper half-wave unit causing the ratchet relay to turn over and position the second wire of the control channel to be set up for valve positioning. A supervisory element is introduced into this action by the fact that when the upstream transmitter is disconnected, the pen arm of the telemeter receiver previously connected to that circuit will go to the bottom of the chart, indicating that the transition at the remote point has been completed.

"Control"

Also tied with the operation of the pen arm going to the bottom of the chart is another device, not shown in the diagram, which is connected to a light which shows green when the change has been made at the remote point and is labeled "control." Before this action took place to light this green light, a white light was burning to indicate that the recorder was connected to the remote transmitter. The white light carries a label "recording." Assume that it is desired to re-position the valve; the operator will then observe the downstream pressure and manipulate the manual control switch either to open or close the valve as desired, the impulse going back over the line that was formerly used to transmit the upstream pressure back to the recorder.

Another device which has been introduced at the remote valve location is a timer of the electronic type which limits the maximum amount of impulse that can be impressed in the valve control circuit at any single time. This timer is adjustable and may be set for anything to a maximum of 12 seconds. If the operator desires to move the valve for a greater time period than that for which this timer has been set, it requires him to release the manual control switch to the neutral position permitting the timer to fall out and then give the manual control switch another movement until the desired positioning has been obtained. The introduction of this limiting timer reduces the possibility of any short circuit or transient impulse of operating the valve for a period longer than its setting.

Automatic Procedure

Assume now that the operator desires to put the valve on to automatic control. He first positions the valve manually to the desired set point so that the automatic equipment does not have to work any more than necessary. The first operation would be to transfer the switch from "manual" to "automatic" and position the second switch from "alarm" to "control." First, the pressure limit pointers of the indicating receiver are positioned to the range desired. After the valve has been positioned to bring it within range, the switch is thrown to the "automatic"

position, and the timing pulse circuit is put into operation.

An additional electronic timing unit has been added into the pulse circuit. This time limiting unit is a further safeguard against the failure of any of the tubes or elements of the electronic contacts in the indicating receiver, preventing the impression of the impulse current on the line beyond a designated time period.

Halting Automatic Control

The automatic control feature can be stopped at any time by throwing the toggle switch back to the manual position and by depressing the selector button; again the impulse will travel to the ratchet relay and return the upstream transmitter back into the circuit. Because of the important feature of the time impulse system of telemetering which does not require synchronization between the transmitter and receiver, the units go back into operation and are always automatically in step. During all the valve positioning operations the telemeter transmitter connected to the upstream pressure tap is revolving continuously; only the impulse circuit is disconnected.

As soon as the upstream transmitter is back on the line and the impulse is being picked up at the clutch coil of the recording receiver, the pen moves to indicate the upstream pressure and at the same time the internal switch in this unit transfers the current from the green light back to the white light, indicating that the recorder is now in circuit.

While the preceding diagram illustrated in detail the main features of the electrical circuit, *Fig. 11* shows the actual instrument and switches which are before the operator. All controls have been reduced to their simplest form. On the panel board, for this particular system, he has before him the 2-pen telemetering recorder which gives a picture of the upstream and downstream conditions of pressure across the control valve.

Below that the white light indicates that he is on recording. Alongside of that is the selector button which, if depressed, will cause the green light to light and the white light to go out, indicating that he has transferred the remote relays to the position of controlling. Below that is the switch which determines whether the control shall be manual or automatic. If it is positioned in the "manual" direction to the left, he then has the manual control switch, which is below, in circuit. He will then have the facility for positioning the remote unit by twisting the handle of the unit either to the right to open the valve or to the left to close the valve. This switch has built into it an inherent feature which when released will always return to the off position so that it requires the operator to hold it physically in either position.

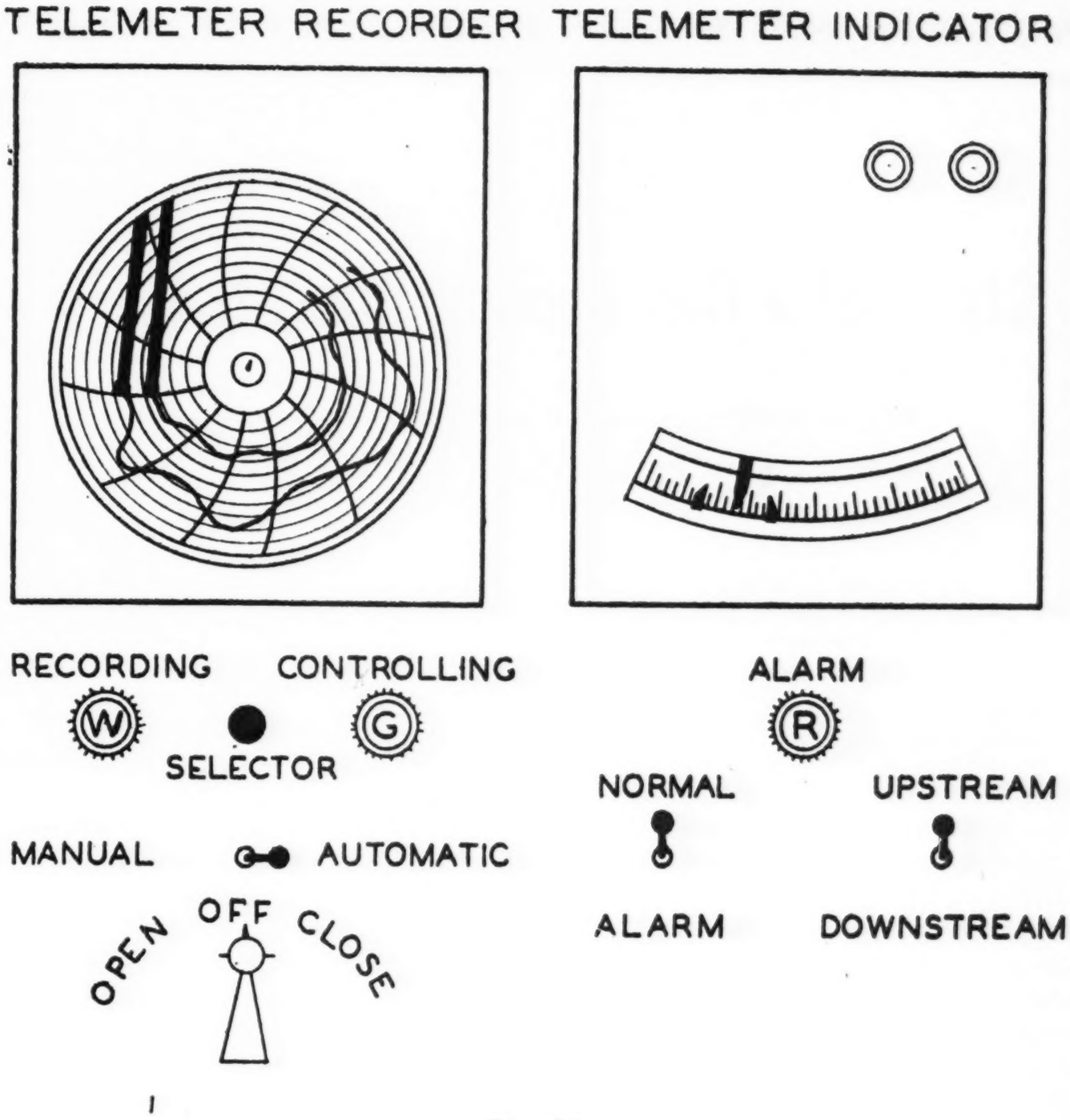


Fig. 11

To the right of the telemeter recorder is the indicator with its adjustable alarm contact having external control knobs so that the points may be adjusted readily to any desired position. Below the indicator to the left is the switch which manipulates the bell circuit when the alarm is sounded and the red light is burning. When positioned downward the bell will be taken out of circuit but the alarm lights will remain burning. When the conditions of the alarm have been corrected the bell will again ring, as previously described and the switch thrown to the upward position clearing it from the circuit and returning things to normal.

Toggle Switch

Alongside this alarm switch is another toggle switch which will determine to which system the telemeter indicator is connected, that is, either parallel to the upstream or downstream record of pressure. Thus it can be seen that the operator has before him actually very few devices.

All other features of control and pulsing are put into circuit when the switch is turned to the "automatic" position. By looking at the telemeter recorder or indicator the operator is instantly aware of all conditions at the remote point.

Time Recorder

The times of day when any of the operations are performed are permanently recorded on the chart, as when it goes to "control," the upstream telemeter going out of the circuit will draw a line through to the bottom of the chart, thus logging the time of operation. The action and performance of the automatic system will also be constantly recorded, thus he has the activities of remote control and telemetering constantly before him.

This system is really a grouping of proven devices reassembled for our special requirement. It is particularly intriguing and fascinating to design such a system and have it perform all these functions over the two simple wires. The further integrating of several such systems to one large coordinated network requires very little more development. With the increasing demand for natural gas the sources of input into any load center are becoming manifold. Centralizing the controls of several transmission feeders at one point will permit the use of available pressures and volumes in a most effective manner.

Study of a Gas Cycling Operation

Report of efficiencies and performance of Cotton Valley field project

By RALPH L. HOCK

Cotton Valley Operators Committee
Cotton Valley, La.

(Condensed from paper presented at the 28th annual convention of the Natural Gasoline Assn. of America, Fort Worth, Texas, April 20-22.)

THE Cotton Valley field is located in Webster parish, Louisiana, approximately 40 miles northeast of Shreveport. In 1937 several rich gas-condensate reservoirs were found in the Cotton Valley series, Upper Jurassic Age at a depth of approximately 8000 to 9000 ft. Since that time additional reservoirs have been found and there are now six known gas-condensate reservoirs in the field. Two of these are now being cycled while a third is being trial cycled. The presently outlined field covers 18,295 acres but additional acreage is now being developed. A total of 139 wells has been drilled, to date, in exploring and developing the deep gas-condensate reservoirs.

In 1940 a unitization and pressure maintenance project was developed by a group of operators who banded together and formed the Cotton Valley Operators Committee, which is composed of representatives of the companies which were operating in the field. The Cotton Valley Operators Committee was granted operating rights over unitized production (certain productive horizons below 6500 ft) and producing equipment in the field. As an agent for all operators in the unit, the committee employs the necessary personnel to carry out the project. Evan A. Thomas is the general manager, directly in charge of the cycling plant and field operations.

In *Fig. 1*, "Principles of a Cycling Operation," the fundamentals of cycling a gas-condensate reservoir are illustrated. Rich gas, commonly called "wet gas," is produced from wells as far from the injection wells as practical. The rich gas contains hydrocarbons which can be condensed and/or extracted at a plant constructed along similar lines to those of a conventional gasoline plant. After as much liquid hydrocarbons are removed from the rich gas as economically practical, the remaining gas is compressed and returned to the injection wells. This dry gas forces wet gas out to the producing wells while maintaining the reservoir under high pressure to prevent retrograde loss.

The technology of cycling is based upon the behavior of hydrocarbon mixtures in the retrograde condensation-pressure range. Laboratory tests permit reliable predictions of the influence of a pressure decline upon the liquefiable hydrocarbon content of a gas-condensate mixture. *Fig. 2* shows what was predicted and what is actually happening in the Bodcaw Sand in the Cotton Valley field. When cycling started in May, 1941, the reservoir pressure was 3300 psig while wet gas produced from the reservoir had a liquid hydrocarbon content of butanes and heavier of 85 bbl per MMcf. On Jan. 1, 1949, the reservoir pressure was 2780 psig and the wet gas contained 72 bbl of butanes and heavier hydrocarbons per million cubic feet of gas. This decline in bottom hole pressure was caused by a net withdrawal of gas for plant fuel, gas sales requirements, and removal of liquid hydrocarbons.

A better perspective of the benefits derived thus far might be noted in *Fig. 3*, "Recoveries from Bodcaw Sand." This particular reservoir originally contained 57 million bbls of butanes and heavier hydrocarbons. By the time the field was developed, unitized, and cycling started, approximately 1 million bbls of material had already been lost because of retrograde condensation. Another 11 million bbls was subsequently lost because the pressure was not built back up to the original 4000 psi. Numerous economic and practical problems prevented recovery of that 11 million bbls of material.

If conventional straight production methods had been followed, only 54% of the butanes and heavier material would have been recovered. Through the cycling program now being followed 67% will be recovered. If cycling and a complete pressure maintenance program could have been started initially, approximately 94% could have been recovered. By Jan. 1, 1949, a total of 362 billion cu ft of wet gas had been produced. That is approximately 75% of the quantity expected to be recovered. The pressure maintenance phase

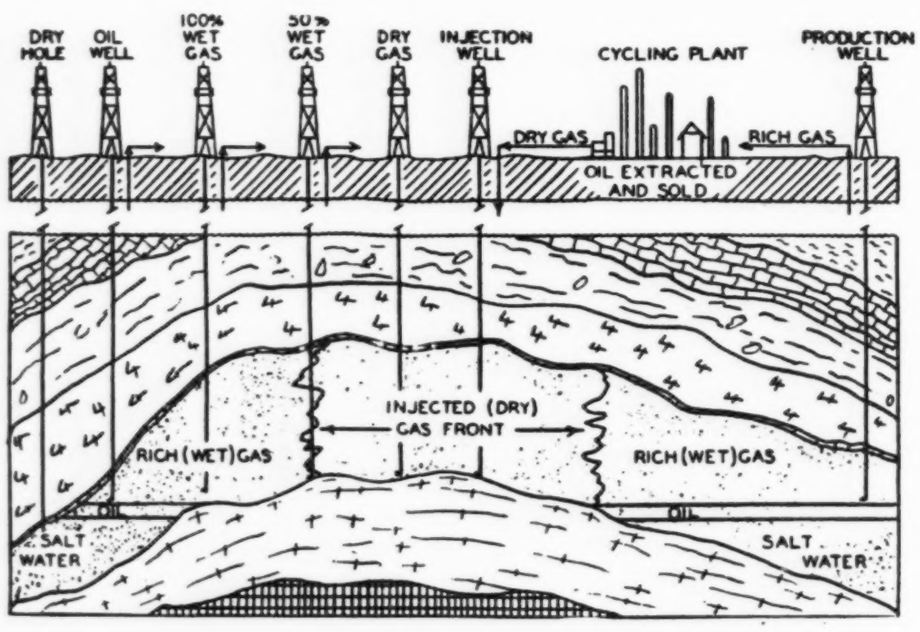


Fig. 1. Principles of a cycling operation.

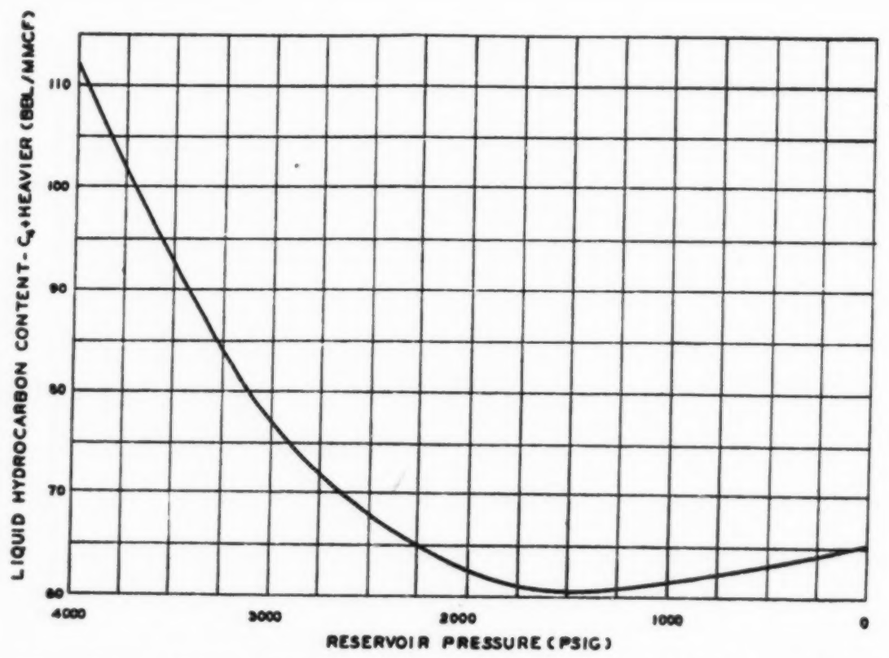
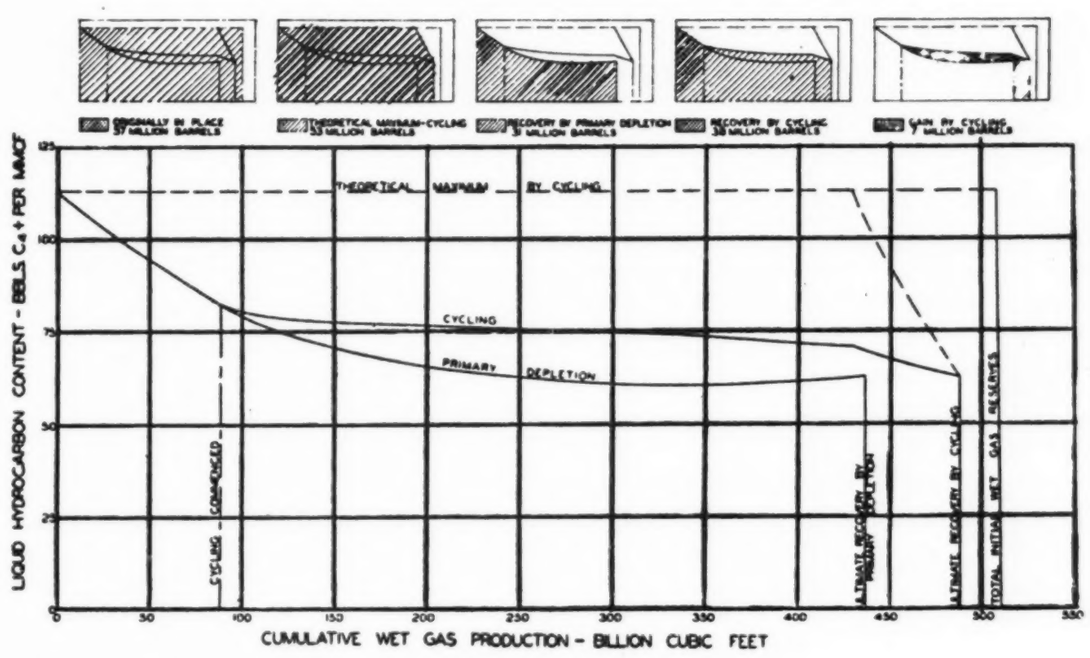


Fig. 2. Influence of reservoir pressure on liquid content of Bodcaw sand gas.



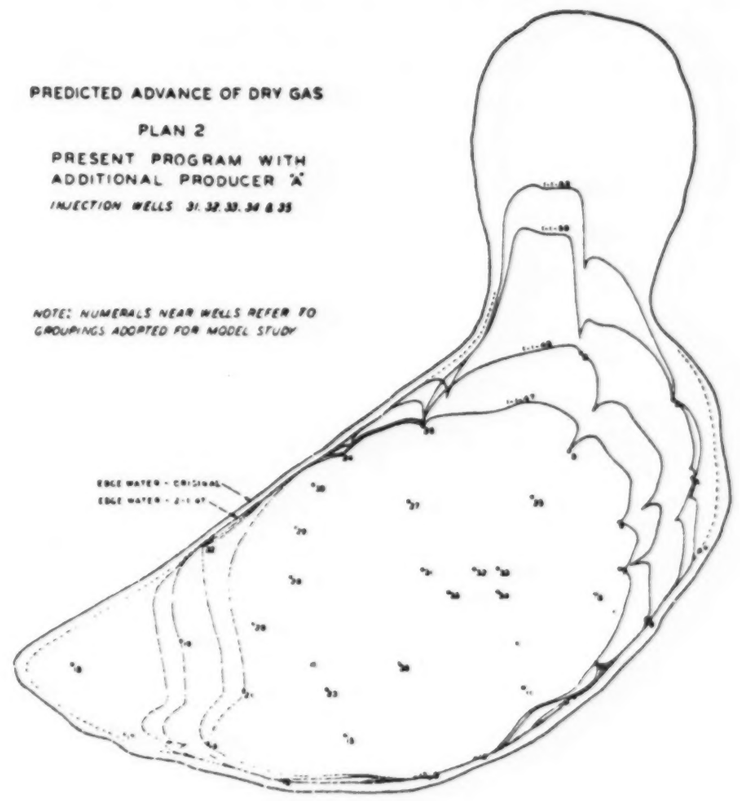

PREDICTED ADVANCE OF DRY GAS
PLAN 2
PRESENT PROGRAM WITH
ADDITIONAL PRODUCER 'A'
INJECTION WELLS 31, 32, 33, 34 & 35
NOTE: NUMERALS NEAR WELLS REFER TO
GROUPINGS ADOPTED FOR MODEL STUDY
EDGE WATER - ORIGINAL
EDGE WATER - 4-1-47

Fig. 3. Above: Recoveries from Bodcaw sand.

Fig. 4. Right: Predicted advance of dry gas in Bodcaw sand.

of this cycling program as carried out thus far has already yielded 6 million more barrels of butanes and heavier hydrocarbons than would otherwise have been obtained.

Another important advantage of cycling, and one that is often overlooked, is the fact that dry gas will be left in the reservoir when the field is eventually abandoned instead of a valuable wet gas. *Fig. 4*, "Predicted Advance of Dry Gas," indicates the economic significance of this point. When cycling is completed the rim wells will be kept on production to bleed the reservoir down to abandonment pressure. That will mean further expansion of the dry gas bubble until an ultimate pattern efficiency of 91% should be obtained.

It is important to note that this pattern efficiency is greater than that at the end of economic cycling. This ultimate pattern efficiency, at time of abandonment, coupled with the measured dry gas displacement efficiency of 87% means that 79% of the gas left in the reservoir, when it is eventually abandoned, will be dry gas. In terms of dollars (based on a conservative value of the material saved) that is $8,377,000 worth of material saved at an expense of $590,000 total compression costs, or a net profit advantage of $7,787,000 from displacement of wet gas alone. Furthermore, the abandonment pressure for dry gas will be less than for wet gas. This has been indicated by one of the other reservoirs.

Based on present available information it is expected that 261.7 billion cu ft of gas will be injected into the Bodcaw Reservoir during the period of economic cycling. Total injection costs (including amortization, depreciation, insurance, etc.) have been $2.25 per million cu ft, at conditions requiring 48 bhp per million cu ft to inject the gas.

Venting and Humidity Control

Problems that research must solve in providing better ventilation in small, tight houses

By SAM C. HITE

Purdue University Engineering
Experiment Station

(Condensed from a paper presented at the Pacific Coast Domestic Research & Utilization Conference held May 25-27 in Los Angeles.)

IN the past 15 years, notable changes have taken place in the character of the living quarters of the American people. First, the pressure of rising costs has resulted in the prefabricated type of house which, with its panel construction, absence of basement, and tighter windows, allows much less outside air to infiltrate. The day of what may well be termed the "60-mesh house" has passed and the problem of keeping the humidity up by the use of numerous pans of water will give way to that of limiting the humidity to a comfortable level.

Second, the rising cost of heating and the desire for more comfortable living conditions has also resulted in a much tighter type of construction, even in conventional houses. It might be noted here that for obvious reasons wherever possible the trend is toward the use of gas. Third, the shortage of living space has caused owners to convert the old spacious private houses or even apartments into units that will accommodate more people. The changes involved in converting these houses and apartments all too frequently involve the placing of space heaters, water heaters, etc., in locations not intended for such uses.

The above conditions have brought with them twin problems, very serious ones for the gas industry. These are the venting of gas appliances where no chimney connections are provided and the control of the humidity within the house.

From our experience in venting research work, it is believed that the following phases deserve immediate attention:

1. More data must be obtained on the factors that affect vents such as capacity, location, height, shape and materials of construction.
2. The effects of wind velocity and direction and low ambient air temperature are not yet fully understood and evaluated.
3. Fresh air intakes and other methods of supplying fresh air for combustion and dilution both by natural and mechanical means should be investigated.
4. Draft devices, draft hoods, and methods of draft control should be critically reviewed and tested when necessary.

From observations made during work on humidity control, it is believed that the following should have immediate attention:

1. An investigation of the possibility of drawing high humidity air from the kitchen to use for combustion and dilution air for the gas space heater.
2. New methods of kitchen ventilation should be surveyed. Directing an air current over the range and collecting the heat and moisture carried by it might prove to be effective and reduce considerably the size of the fan necessary to maintain comfortable conditions in the kitchen.

3. A study of the behavior of odors, greases, and oils, in order to determine how they differ from moisture would be important if a kitchen ventilation system is to serve to its fullest extent.

The endpoint of all the work should be the education of the installers and users of the appliances. Any present information and any obtained in future research should be rewritten into a well-illustrated and easily understood manual that could be distributed to the manufacturers, public utilities groups, architects, plumbers, and sales groups —in fact, anyone connected with the installation or use of gas-burning equipment.

Venting of Restaurant Appliances

Considerations in selecting proper type of equipment to ventilate commercial kitchens

By LOUIS SINGLETON

American Stove Co.
San Francisco

(Condensed from paper presented at the customer service conference, Pacific Coast Gas Assn., March 3-4, San Francisco.)

TO ventilate a gas fueled kitchen properly, we must give consideration to certain variables.

1. *Design Temperature*
   By this we mean a desirable average temperature in the area occupied by operators, cooks, and dishwashers, as well as the temperature desired to be maintained for other employees, such as the salad chef, the checker, etc.
2. *Room Size*
   The smaller the room the higher the temperature will be for a given amount of steam-producing or heat-radiating equipment.
3. *Arrangement of Equipment*
   Will major heat radiating or steam producing equipment be grouped — that is, cooking equipment under one vent assembly and dishwashing equipment under another? Will several units of equipment be distributed outside the hood or ventilated area, as steam cookers, pressure cookers, and steam tables?
4. Will the kitchen proper be cooled by mechanical means, such as air conditioning or fresh outside air through dust filters, etc.?
5. *Type of Operation*
   Will frying, boiling, or steam cooking predominate? Will boiling and steam cooking be done on ranges or partly with specialized equipment?

Other variables might be mentioned, but these will serve to illustrate the many which should be considered by those responsible for properly engineering a modern commercial kitchen.

There are two approaches to the problem of venting appliances:

1. One or more hoods designed to extend beyond dimensional limits of the equipment.
   This hood is to be designed for and equipped with a suitable exhaust fan, preferably on the roof. Two or more hoods may be connected by duct work.
2. Unit ventilators or local exhaust venting systems. These ventilating units are attached to or are located at the appliance in such a manner that they appear to be part of the appliance.

With regard to the first approach, a hood assembly must be designed to:

1. Remove smoke and steam from the equipment it shelters sufficiently fast to offset air currents which might divert intended flow of heated air products.
2. Filter, condense, or otherwise prevent excessive amounts of grease from entering flue stacks so that deposits are not formed on the roof. (The same care should be exercised in providing for cleaning of traps, filters, and troughs to prevent condensed grease from dripping into food or work areas.)
3. Prevent flue fires, as our major competitive fuel salesmen take great comfort in and make capital of such misfortunes.
4. Have sufficient capacity so that it will accomplish air changes in the room, using normal or special inlets, in order to provide comfort to all employees and to prevent kitchen odors from entering the dining room.
5. Employ venting methods so that the hood conforms to the limitations and requirements outlined in the various ordinances of the areas where it is installed.

Many of the mechanical principles of open hood venting can be applied to localized exhaust systems. There are two types of venting under this heading:

1. Those designed to remove grease and suspended dust by means of filters built into the unit.
2. Those designed to trap grease by means of baffles and/or turbulence chambers.

The unit vent eliminates the necessity of a hood or canopy. Being somewhat portable, it can usually be relocated by making the necessary changes in duct work and fan speed. Small units can be designed as part of an assembly of coffee urns, waffle irons, griddles, or fryers. Such small units can be readily adapted to "front of the house" food preparation, such as windows or back bars. Such units eliminate high shelving and wall flashing. Most are designed with careful thought to eye appeal; all are available in stainless steel. Small to medium-size installations seem most approachable for this type of equipment.

Advocates of this method make the following claims about the equipment:

1. Modern in appearance, New in design. Filters entirely concealed from view.
2. Easier to clean. No large hood areas and hard to reach corners. All parts requiring cleaning can be reached from floor level or a box.
3. Removes smoke, grease, and steam back and away from cook.
4. Injects air-suspended products nearer source of origin before being permitted to expand and flow away from unit. Source of injection under hood approximately 20 or 22 in. from appliance instead of 44 to 46 in. when canopies are used.
5. Performs equally well in large or small room. Being chiefly concerned with surface products, intake removes air from directly over work area.
6. One make injects ceiling air down through opening installed in top of ventilator to remove a portion of the warmed upper strata of ceiling air as well as to insulate back of the ventilator.
7. Reduces fire hazard by passing grease laden air through filters, thus entraining most of the grease.

LIMITED SUPPLY OF SAFETY ISSUES AVAILABLE

Despite a press run exceeding the normal production by several thousand, only a few copies of the July Safety Issue of GAS remain on hand. Here are quotations from a few of many letters received that will explain why:

"We wish to compliment you on the July issue of GAS and to commend the thoroughness with which you have approached the subject of accident prevention. There are many items in this issue which are of great interest to us here and which will prove to be useful in our work in this field." Franklin Knight Jr., Atlanta (Ga.) Gas Light Co.

"The safety issue of GAS is a monumental contribution to the industry. I commend you highly for its publication and for the great interest in the industry which inspired you to go ahead with it." H. Carl Wolf, AGA.

"Congratulations . . . It is the first time I have seen a publication that gives such a comprehensive coverage toward the promotion of safety within an entire industry." A. H. Harris Jr., Winnipeg (Can.) Electric Co.

"I believe that it is the nearest to a safety handbook that I have ever seen for different phases of the gas industry. I think so much of it that I am saving it for my personal files." E. A. Munyan, Atomic Energy Commission, Oak Ridge, Tenn.

"Please accept our order for 45 copies." W. E. Himsworth, The Brooklyn Union Gas Co.

"We would like to have 35 additional copies." L. W. Esten, Central Illinois Gas & Electric Co., Rockford.

As we do not intend to reprint the issue, companies desiring additional copies for their employees are urged to get their orders in promptly, addressing them to GAS, 198 S. Alvarado St., Los Angeles 4, Calif. And here's a tip:

Order a year's subscription and make it retroactive to the July issue. The price for 12 issues is still $2, the same as for the big single Safety Issue.

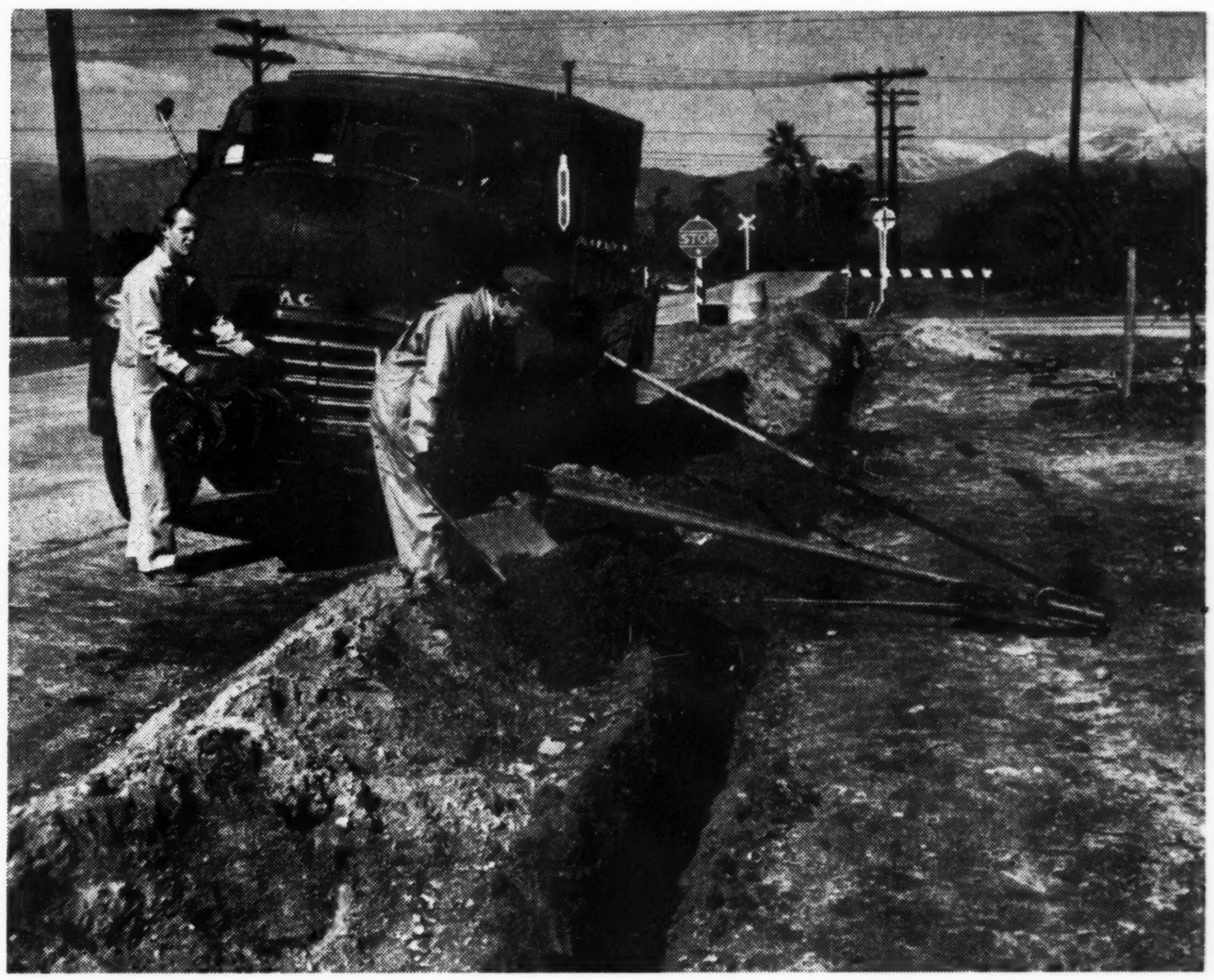
Operating Ideas and Equipment

Use of morman board in backfilling . . . a boring pipe guide . . . a method of detecting entrained materials . . . a scraper for filling in bell holes . . .

Backfilling With Boom-and-Board

Many companies are perhaps familiar with the boom and mormon board used since the end of the war by the Southern Counties Gas Co. of California for backfilling. The assembly consists of a utility hoist mounted on the front truck bumper as shown in the illustration, a boom and brace to support a pulley over the excavation, and a mormon board. The boom is not used when the truck can be run on the side opposite the spoil bank.

Southern Counties has determined the break-even points between which this method is more economical than hand backfilling and the contractor-operated tractor. The company's analysis shows the cost of backfilling 79 cu ft (approximately 21 ft of 18 x 30-in. trench) by hand shovel to be equal to the cost of the boom and mormon board method. Below this, hand backfilling is more economical. The study also shows the cost of backfilling 1680 cu ft (approximately 450 ft of 18 x 30-in. trench) to be the break-even point between the boom and board method and the contractor-operated tractor. The economical range of the mormon board without the boom is slightly greater.



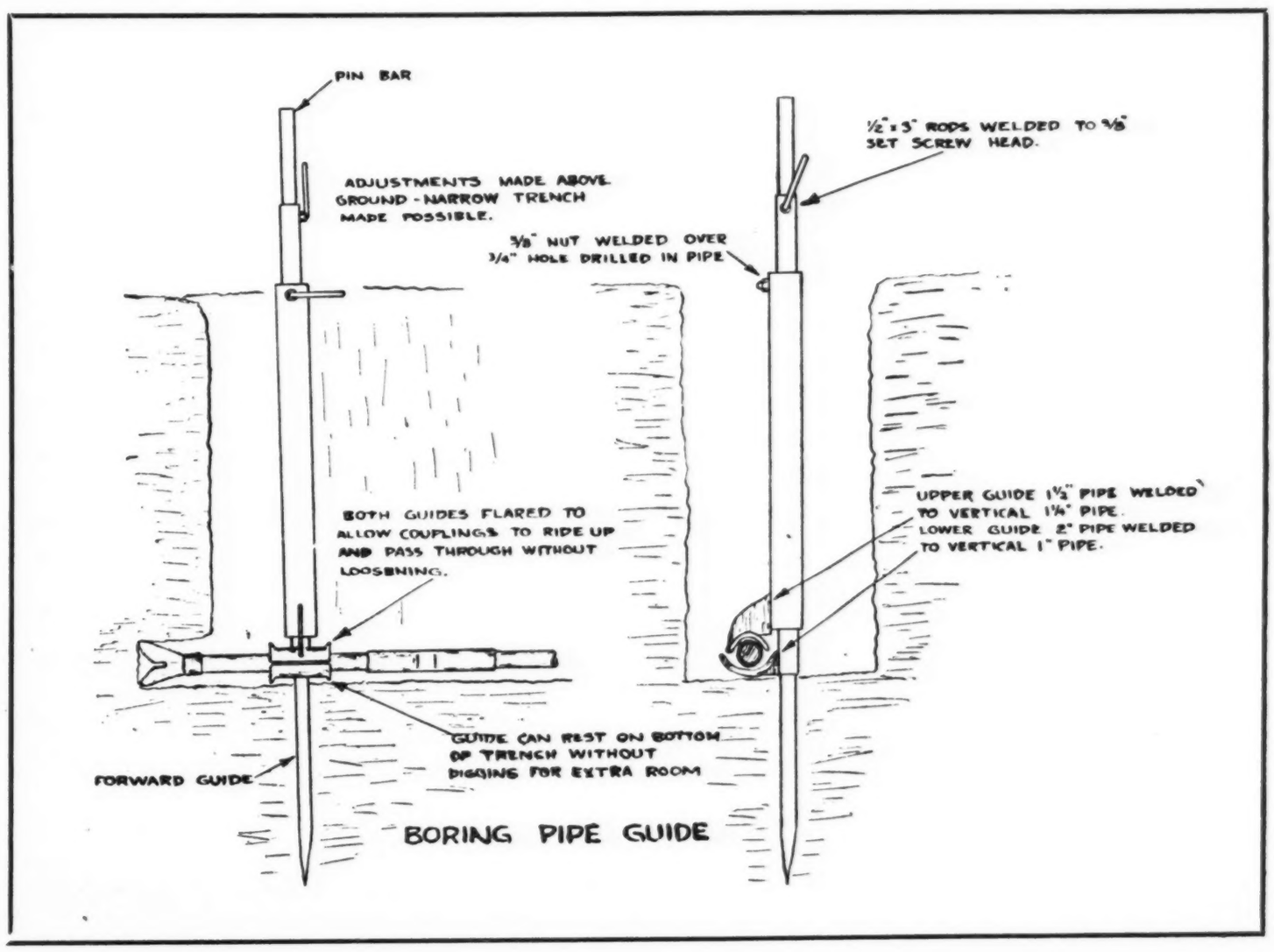
In this analysis, one man operated the board, a second operated the winch, a third drove the truck, and one man leveled the backfill behind the truck.

(Excerpt of a paper presented by J. R. Rensch, regional gas engineer, Coast Counties Gas & Electric Co., Concord, Calif., before the Pacific Coast Gas Assn. distribution conference in April.)

Guide Eases Job Of Pipe Boring

Sketch shows a boring pipe guide that requires a trench of no greater depth than the bore depth and allows all adjusting to be done above the ground level. The latter feature permits a narrow trench and relieves the crew from working in mud and water. The guides have set screws with handles for adjustments. Thus no wrench or other tool is required.

(Excerpt from paper presented by J. R. Rensch, regional gas engineer, Coast Counties Gas & Electric Co., Concord, Calif., at the Pacific Coast Gas Assn. distribution conference in April.)


PIN BAR
ADJUSTMENTS MADE ABOVE GROUND - NARROW TRENCH MADE POSSIBLE.
3/8" NUT WELDED OVER 3/4" HOLE DRILLED IN PIPE
1/2" x 3" RODS WELDED TO 3/8" SET SCREW HEAD.
BOTH GUIDES FLARED TO ALLOW COUPLINGS TO RIDE UP AND PASS THROUGH WITHOUT LOOSENING.
UPPER GUIDE 1 1/2" PIPE WELDED TO VERTICAL 1 1/4" PIPE.
LOWER GUIDE 2" PIPE WELDED TO VERTICAL 1" PIPE.
GUIDE CAN REST ON BOTTOM OF TRENCH WITHOUT DIGGING FOR EXTRA ROOM
FORWARD GUIDE

BORING PIPE GUIDE

A Method for Continuously Detecting Entrained Materials in Gas Streams

Entrained materials are continuously detected but not determined in a gas stream impinging upon a white paper chart rotated by a clock. A circular line, traced on the paper by an oil fog, mist, or dust can be seen, indicating the presence of a fog, mist, or dust in the gas.

An impinger unit first made detected oil fog 600 ft from its origin, an oil seal inside a low pressure holder on which the sun was shining; however, it gave only a small spot on a piece of filter paper.

Continuous Record

A way to move the paper that would give a record for hours or days was sought. For this, only a clock, an orifice, a chart, and a case were needed.

We had a Bristol recorder, from which we removed the pen, replacing it with a small copper tube through which gas could pass. One end of the tube was bent 90°. A cap, with a hole drilled with a No. 77 drill (.018 in.) was placed over the open end so that a stream of gas flowed through the small hole or orifice and impinged on the recorder chart, which was made of a large filter paper. Clocks of two and seven days per cycle were used; each gave full time to build up the dust or oil trace on the chart so that it could be seen as a thin brown line. The recorder is shown in *Fig. 1*.

The brown line traced on the chart may be oil, gum, or gas-main dust.

If a drop of benzene put on the brown line makes it spread or fade, it is oil.

To detect iron, the brown line is fumed over strong hydrochloric acid, and weak potassium ferrocyanide solution is dropped onto it; if the line turns blue, iron is there, indicating that iron dust or rust was in the gas.

Low Pressure Use

This set has been used at low pressure. It was first used in a test for the loss of an oil film on the water in a low pressure holder, to prove that on hot days, seal-oil vapors are picked up by the gas and condense, forming a fog or mist when the gas cools in the distribution mains.

It can also be used in a gas plant to search for oil fog where there should be none, and to see if any part of the plant fails to turn out clean gas.

Dust can be found in natural gas with this set, and the depth of the line traced on the chart can be checked with the gas rate, before any harm can be done.

(Condensed version of a paper presented by Leon J. Willien, research engineer, San Diego Gas & Electric Co., before the PCGA technical services conference, April 28-29.)

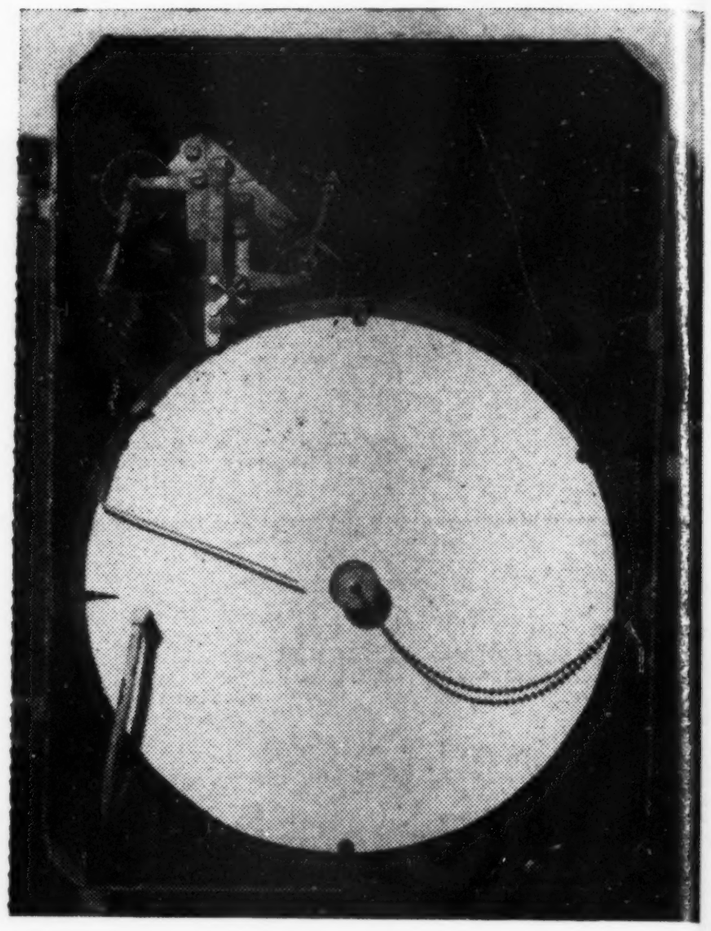
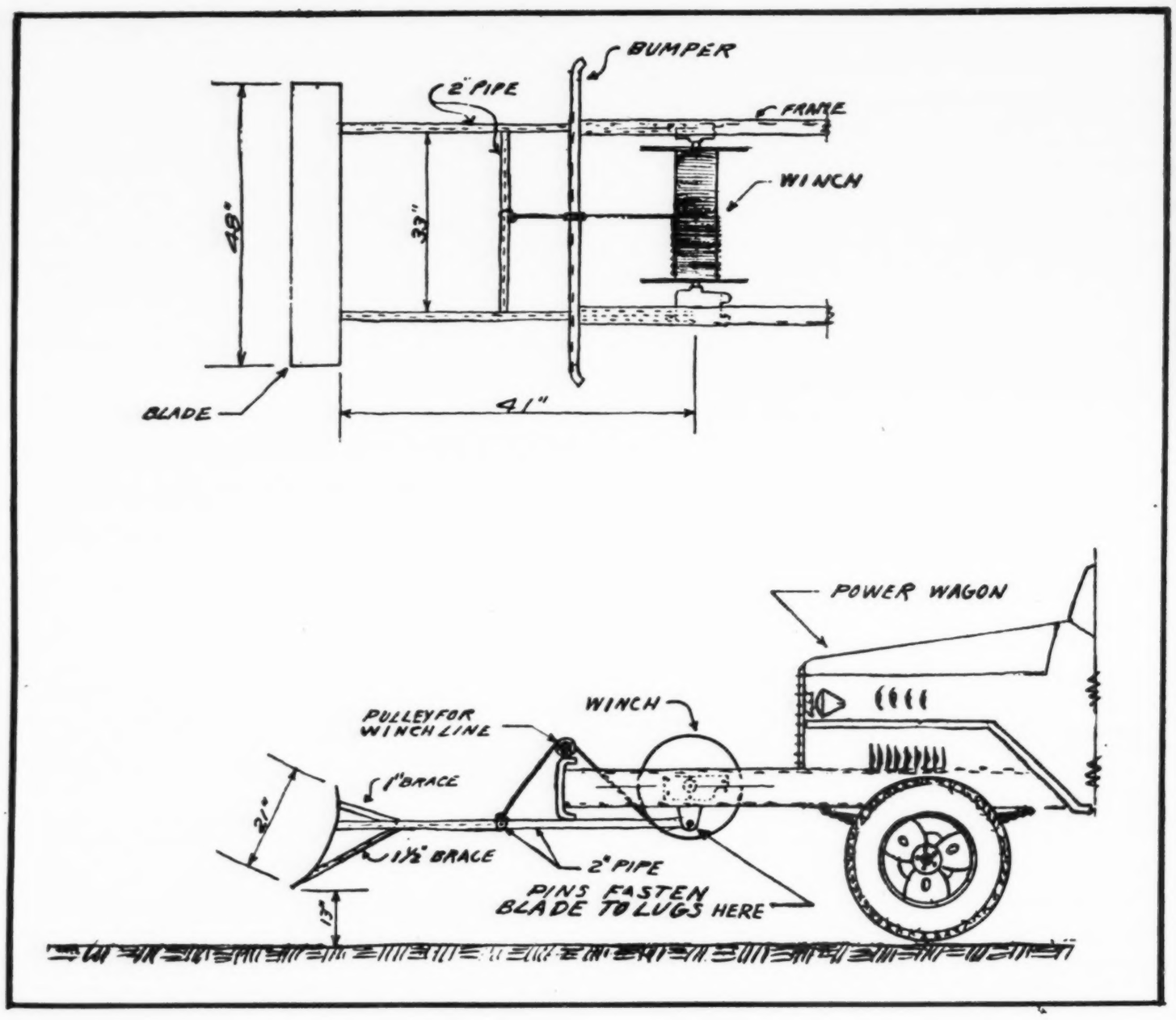


Fig. 1. Recorder altered to detect entrained materials in gas streams.

Winch-Operated Scraper for Power Wagons

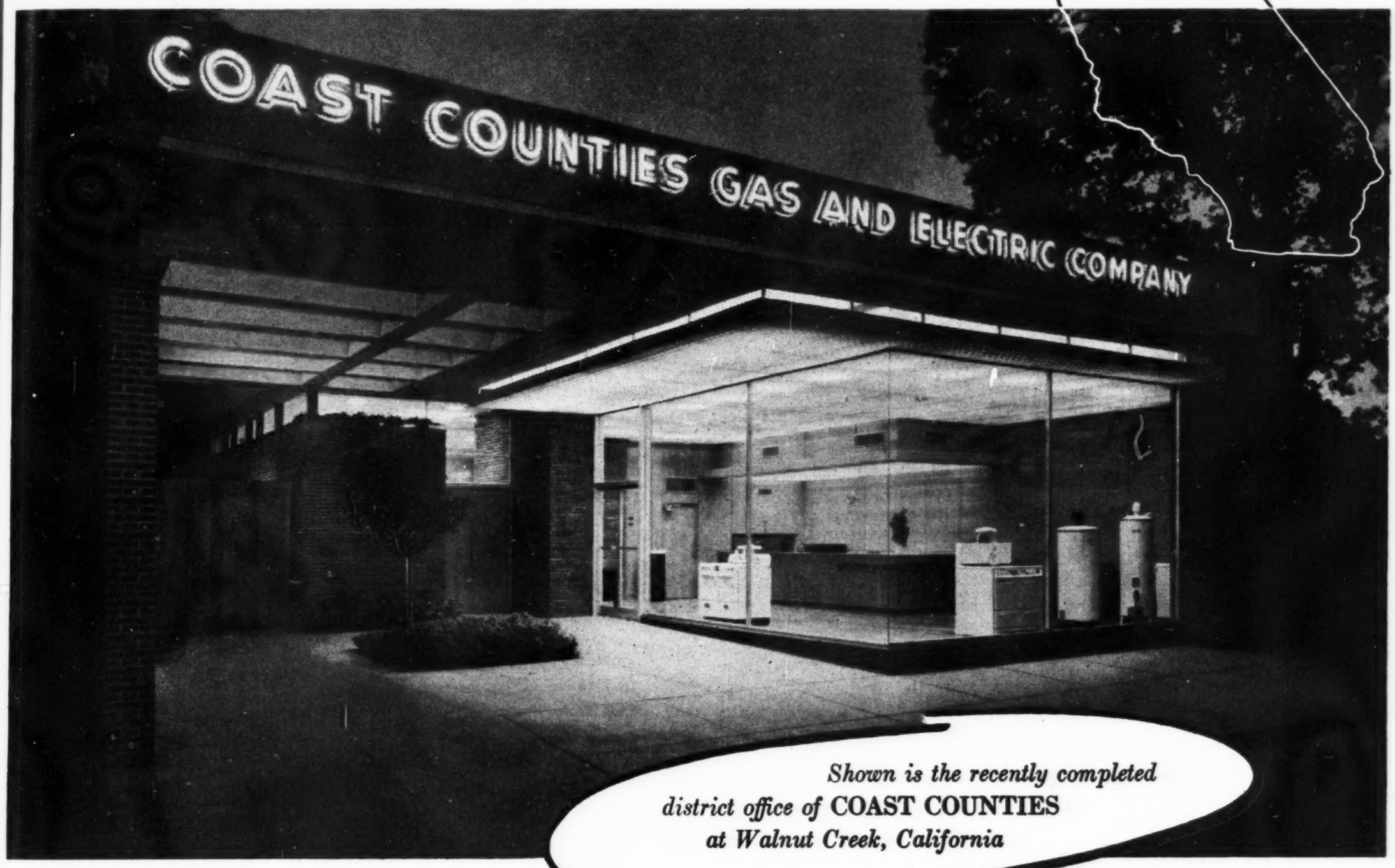


This device consists of a blade for filling in bell-holes, ditches, etc. It can be placed on the front of a power wagon or any truck that has a front winch. By using the front winch, the blade can be raised or lowered 13 in. Materials needed for the device are a 20 x 48-in. blade and two 2-in. pipes 41 in. long with 1-, 1½-, and 2-in. pipe braces. The scraper is of welded construction and is easily removed or attached by inserting or removing pins placed in lugs welded to the bottom of the truck frame.

The scraper was suggested by Clarence A. Fetty, of Hope Natural Gas Co.'s main line department, Grantsville, W. Va.; won company approval.

Symbol of Service

to CENTRAL CALIFORNIA COMMUNITIES



Shown is the recently completed district office of **COAST COUNTIES** *at Walnut Creek, California*

To each of the natural gas customers we serve, **COAST COUNTIES** symbolizes service of a high standard. It is the company's constant aim to improve and widen the acceptance of gas in all fields and to promote the interests of the industry as a whole. We are rendering natural gas service to many Central California communities, including Antioch, Avenal, Concord, Gilroy, Hollister, Lafayette, Los Banos, Martinez, Pittsburg, Rodeo, Santa Cruz, Taft, Walnut Creek and Watsonville as well as numerous lesser populated communities.

Coast Counties
Gas and Electric Company

EXPANSION

LIQUEFACTION PLANT

FPC approves 400 MMcf plant near Chicago

Chicago District Pipeline Co. will spend $6 million soon for a natural gas liquefaction plant. The company received an FPC go-ahead early last month.

The plant, of necessity limited to an isolated area, will be built in Will county, Ill., near Chicago. It will have a storage capacity of 400 MMcf, will be able to liquefy 4 MMcf daily for regasification, and will have facilities to return 6 MMcf per hr to the transmission system.

The Federal Power Commission authorization of the liquefaction plant recalls a liquefaction installation of East Ohio Gas Co. in Cleveland, from which the gas, stored at extremely high pressure, exploded in 1944 with great property damage in the city. The liquefaction process, involving removal of butane, propane, and nitrogen, and storage of liquid gas at a temperature below boiling point, was recognized by the commission as involving "extraordinary hazards"—but it considered Chicago District's extensive study of use of the process since 1929, operation of its own pilot plant since 1934, and its assumption of complete responsibility for the design, construction, and operation of the proposed plant, as indicative of establishment of engineering feasibility and technical soundness of the plan.

Chicago District will offer services of the plant under rate schedules based on cost of operation, and will finance the venture with funds loaned by its parent company, Peoples Gas Light & Coke Co., Chicago.

RATE DROP PROMISE SWAYS MILWAUKEE TO NATURAL

On Aug. 1 the Milwaukee (Wis.) Common Council approved the substitution of natural gas for manufactured in the city, when such gas is available, but there was a string tied to the approval. It was given with the proviso that there must be a reduction in the cost of natural gas to the extent of 20% on every gas bill.

Milwaukee Gas Light Co. is said to have informed the council some time ago that such a reduction would be made when natural gas became available, and B. T. Franck, vice president of the utility, said that 20% is a conservative estimate.

The council's decision signalled the finish of a drawn-out battle over the question of whether rates would be cut when the natural gas arrives. Yielding to the pressures of opponents of conversion, skeptics on the board had demanded some sort of guarantee from the company that substantial reductions would be made. The council gave such assurance in its approval, but John J. Dolan, first assistant district attorney of Milwaukee, said putting a cost clause into the approval was a mere waste of words, as rate setting is the job of the state public service commission.

Meanwhile, the company, which has started

construction facilities to receive the gas, has purchased about a dozen old buses from a transport company in Michigan and converted them into mobile workshops for the service crews now going the rounds making conversions.

The first conversion work must be finished by Jan. 1, 1950, gas company officials say, as that may be the date when natural gas can be turned on in homes and for industry. It is said that about 1 million burners must be converted by that time to make them suitable for natural gas.

The bus workshops will be used by about 1200 workmen in various areas of Milwaukee county. About 215,000 gas meters must be visited, it is reported. The buses purchased as mobile workshops for the gas company's crews are 26 ft in length and have the seats removed to allow space for work benches along the sides. There will be 3000-watt electric generators, one in each bus, so that tools such as grinders and drill presses can be operated near the job. Each will also have a number of storage bins.

From each bus, assigned to a certain territory, 100 men will operate, and about 1200 men are being hired for this work, which is expected to last at least four months. Many of the experts are being brought from other cities.

The vehicles will attract attention on the streets as they are painted a bright red, with the words "Gas Conversion" on the side, which is expected to help make the public natural-gas conscious. Each bus, when fully equipped with generators, etc., is expected to cost about $2500.

HOUSE HEATING SURVEY OUT; TWO UTILITIES LIFT BANS

Further easement of restrictions on gas house heating installations for the 1949-50 winter season is indicated in the American Gas Assn.'s "Gas Househeating Survey," off the press last month. But the situation remains tight in many areas and within many utilities, and absolute lifting of all bans must await expansion programs that are still in the planning stage.

The advent of natural gas during the past year has completely solved the supply-demand imbalance in areas served by some of the more fortunately located distributors. LP-Gas standby plants have cleared the way in other cases, and in the northeast some companies, by enriching their gas and expanding manufacturing facilities, have at least gotten on a "selective" basis.

In general, the news is better for the manu-

For the first time in the New York city metropolitan area, a public utilities company will use television this fall as a regular medium of public service. Consolidated Edison Co. of New York Inc. recently contracted with WPIX, the New York "News" television station, for presentation of TelePIX, the television news program, for five minutes on each of six days of the week.

TelePIX has gained quite a reputation among news gatherers for its on-the-spot reporting of news happenings in the New York area. Utilizing the facilities of the "News" in its coverage, TelePIX has startled the city with the first timely television news program.

Shown above as the contract is signed, are (seated) Ralph H. Tapscott (left), chairman of the board of ConEd, and Robert L. Coe, station manager of WPIX. Behind them are Scott Donahue, assistant sales manager of WPIX; Charles B. Delafield, assistant to Mr. Tapscott; F. M. Flynn, president of the New York "News"; Hudson R. Searing, ConEd president; and Len Carey, advertising account executive.

facturers of equipment and for customers than it was a year ago, when the first survey was published by GAMA.

Distribution of the report began last month, one copy going to every cooperating utility and manufacturer. Covering 94% of the total residential customers in the United States, it tabulates number of customers, present househeating customers, and those to be added during the coming season. This information is classified by states and by individual utilities, and clarifying comments are given which throw further light upon market conditions.

Coincident with the publication of the survey, two utilities let it be known that they were ready to accept applications for gas heating jobs.

If authorization is granted by the Illinois Commerce Commission, says Peoples Gas Light & Coke Co., Chicago, 6000 more heating customers will be accepted. That would bring the year's total to 14,000, the commission having already granted 8000 as a quota for the year. A bigger increase than expected in natural gas moving in from the Southwest is responsible for Peoples raising its sights.

A six-month study of operating conditions on the dual pipeline system of Peoples' subsidiary, Natural Gas Pipeline Co. of America, proved that the system can handle about 5% more gas than was originally estimated.

Other customers along the Natural's line, in Kansas, Nebraska, Iowa, and Illinois will also benefit from the tests.

And up in Detroit, Michigan Consolidated Gas Co. opened the doors on space heating Aug. 1, after 2½ years, and then stood back out of the way while the rush began. The company didn't have to wait long: by quitting time Aug. 3, the office staff had accepted space heating applications for 24,449 customers, including 21,994 from Detroit.

In addition, Mich-Con received 6348 letters, 1876 phone calls, and 946 builders' requests for gas space heating applications. Total response: 33,619 space heating applications in the first three days.

The taking-on of new space-heating customers was attendant upon the expectation that the Michigan-Wisconsin pipeline, which will serve the Detroit area, will be in operation by the start of the peakload season, Dec. 1.

JOINT TENANCY FOR AGE FIRMS

In a move designed to add greater manufacturing facilities to both lines, Payne Furnace Division (Affiliated Gas Equipment Inc.) is transferring its manufacturing equipment from Beverly Hills to the Monrovia, Calif., plant of the Day & Night (water heater) Division, which is expanding its installation to accommodate production of the Payne line.

In addition, two new buildings, to house Payne sales operations, research staff, and warehousing, are in the final stages of construction adjacent to the Monrovia plant.

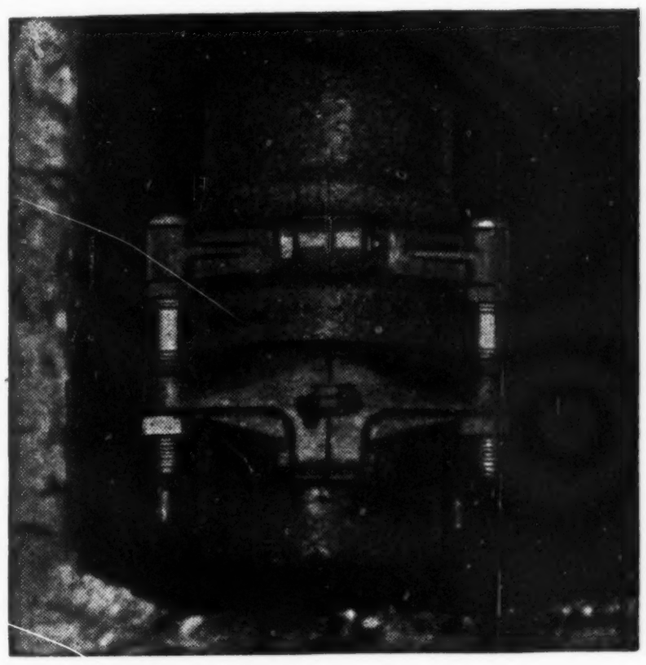
Concurrently, Payne is dissolving its retail operation and will appoint dealers to market the Payne line in Los Angeles and Orange counties, where heretofore the division has maintained its own retail network. Payne and Day & Night will both maintain separate systems of selling and sales personnel, and product distribution.

A SIMPLE SOLUTION for one of the GAS INDUSTRY'S *most trying problems*

the NORMAC BELL JOINT CLAMP

SOLVES YOUR JOINT REPAIR PROBLEMS

6 inch Normac Clamp being lowered into hole for installation



6 inch Normac Clamp in service after installation

QUICK • EASY • PERMANENT

Installed in small pavement openings. Available in all standard sizes from 3" to 12". A simple set of tools cleans the joint, installs the clamp . . . often in only a quarter of an hour. SAVES TIME. SAVES MONEY and the repair is permanent. Designed for all conditions particularly where pavement repair costs are prohibitive. Such small opening repairs are scarcely noticeable when pavement is replaced.

Normac Clamps can be installed in large as well as small openings.

Norton - McMurray hold definite leadership in the development of methods for installation and rehabilitation work through small openings. We welcome the opportunity to help solve a problem you may have—tell us about it.

Write for our catalog describing our complete line of COUPLINGS . . . FITTINGS . . . SERVICE TEES and ELLS . . . SLEEVES . . . COMPRESSION-END COCKS . . . METER BARS and BRASS FITTINGS for copper pipe.

NORTON-McMURRAY MFG. CO.

39 SOUTH LA SALLE ST. • CHICAGO 3, ILL.

Method and product covered by U. S. Patents, Nos. 2,163,261 and 2,178,286.

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WITH R-C dual-ability
CENTRIFUGAL
H-186-A
One of a battery of three type H, multi-stage R-C Centrifugal Blowers; each direct-coupled to 700 HP motor; capacity of each blower is 15,000 CFM.
ROTARY
1135
R-C Rotary Positive Blower, variable speed, 400/200 RPM; capacity is 12,000 CFM.

You're not confined to just one type of blower or exhauster when you bring your air or gas handling questions to us. That's because we build both Centrifugal and Rotary Positive units. You can specify the equipment best suited to the specific job. We are the only blower manufacturer offering this *dual choice.*

R-C *dual-ability* delivers other advantages. Our extensive lines of Centrifugal and Rotary Positive types enable you to match capacities, pressures and other characteristics closely to your requirements—resulting in economies both in first cost and in operating cost.

You can bank on the performance of R-C Blowers, too. Building equipment for handling air and gas has been our only business for almost a century—so we *must* give complete satisfaction to every customer.

ROOTS-CONNERSVILLE BLOWER CORPORATION
909 Oregon Avenue, Connersville, Indiana

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BLOWER BUILDERS · R-C · SINCE 1854

BLOWERS • EXHAUSTERS • BOOSTERS • LIQUID AND VACUUM PUMPS • METERS • INERT GAS GENERATORS

★ ★ **ONE OF THE DRESSER INDUSTRIES** ★ ★

BALTIMORE TO GET NATURAL FROM ATLANTIC SEABOARD

Atlantic Seaboard Corp., a member of the Columbia Gas System, has received an FPC go-ahead on a plan to sell 70 MMcf daily of natural gas to Consolidated Gas Electric Light & Power Co. of Baltimore.

Sales are to begin in May 1950, and will increase from 30 MMcf in the first five months to an ultimate total of 70 MMcf daily after 18 months. Necessary metering and regulating facilities will cost about $255,000 and are to be completed by Atlantic Seaboard before May 1950.

The commission pointed out that Atlantic's sale of natural gas to Consolidated should bring about several benefits to the Baltimore area. The utility has indicated its intention to file rate schedules with the Maryland Public Service Commission which would reduce annual rates by $7.5 million effective from the date of the changeover. Also, the changeover will result in expansion of gas service.

Noting that the rates proposed by Atlantic for deliveries to Consolidated "may be unreasonable," FPC ordered Atlantic to file "satisfactory" schedules and charges covering the proposed service at least 60 days before deliveries begin.

EASTERN ARKANSAS' PLEAS FOR GAS FINALLY GRANTED

Twenty eastern Arkansas counties may expect natural gas service by the fall of 1950, W. H. Marbury, president of Mississippi River Fuel Corp., said last month.

The corporation will have expanded its facilities to a capacity of 266 MMcf daily by Jan. 1. Additional increases finally reaching 400 MMcf by the fall of 1950 are anticipated.

The 20 counties in Arkansas expected to be among the beneficiaries of increased Mississippi River Fuel transmission have been requesting natural gas service for six years, but have had no success due to pipeline shortages.

HUGE LP-GAS STORAGE PLAN

A contract for thirty 30,000-gal LP-Gas tanks was signed last month by the Connecticut Coke Co. (New Haven) and H. Emerson Thomas & Associates Inc. When in place, the tanks will represent one of the largest installations of its kind to be made this year.

The tanks will contain propane, which will be used for enrichment of producer gas both during peakload and baseload periods. Connecticut Coke will supply it to utilities in New Haven and surrounding communities.

The installation will include 1200 ft of pipe to the vaporizers, two 2000-gal-per-hr vaporizers, two elevated unloading towers, and two unloading compressors.

24 NEW BC OVENS PRODUCING

Production of gas and coke has been started at 24 new ovens under installation by the B.C. Electric Railway Co. at its Vancouver (B.C.) plant. The ovens have capacity of 2.7 MMcf of gas each per 24 hours, and will replace 24 older ovens.

When completed, the ovens will raise

output-per-day by 17.75 MMcf. Sixty thousand tons of coke will be produced annually for use by B.C. Electric in its carburetted water-gas plants in Vancouver and Victoria.

WHITE-RODGERS OPENS OFFICE

The White-Rodgers Electric Co., maker of automatic controls for heating, air conditioning, and refrigeration, has opened a new branch office at 3-219 General Motors building, Detroit, according to announcement by Charles M. O'Brien, Detroit district manager.

The new office will serve the greater Detroit area. Home office of the company is in St. Louis, and branch offices (each with a sales engineer-representative) in New York and Chicago.

NEW WELDING LINE

Tempil Corp., New York City, has announced that Metal & Thermit Corp., 120 Broadway, New York, has added Tempil temperature-indicating products to the lines of welding accessories it distributes. Tempil products are now stocked by Metal & Thermit's district offices and are available from their distributors.

METTLER ADDS DISTRIBUTOR

The Enterprise Heat & Power Co., 1401 W. North Ave., Chicago, is now a distributor for Lee B. Mettler Co. of Los Angeles, manufacturer of industrial gas burners. Enterprise has been connected with the fuel oil and gas industries for many years as a distributor of utilization equipment. The firm will represent Mettler Co. in the Midwest area.

FINANCIAL

BROOKLYN UNION EARNINGS UP FROM 1948

Brooklyn Union voted a dividend of 40 cents a share in a directors' meeting last month, payable Sept. 1. Two dividends of 25 cents each had been voted already this year.

Company income for the second quarter of 1949 was reported as $1.09 million—or $1.46 per share. That figure compares with earnings of $574,348 for the second quarter of last year, or 77 cents per share. For the six months ending June 30, earnings of $2.245 million ($3.01 per share) were reported, as against $73,514 (10 cents per share) for the like period in 1948.

In releasing the report, Board Chairman Clifford E. Paige warned stockholders that earnings to date should not be assumed an indication of what returns will be for the entire year, since the company is expecting seasonal dips late this summer and early fall.

Some $4 million is being earmarked by Brooklyn Union for expenditures attendant to the arrival of natural gas in the company's area in the fall of 1950.

HOME GAS RATES UP

FPC has accepted for filing the proposed gas tariff of Home Gas Co., designed to increase the company's natural gas rates for

A NEW MODEL-B LONGHORN Mobile DITCHER IS JUST About Ready

Seven important improvements in the new Model B Longhorn Mobile Ditcher contribute to greater efficiency, convenience in operation, safety to personnel, and longer life.

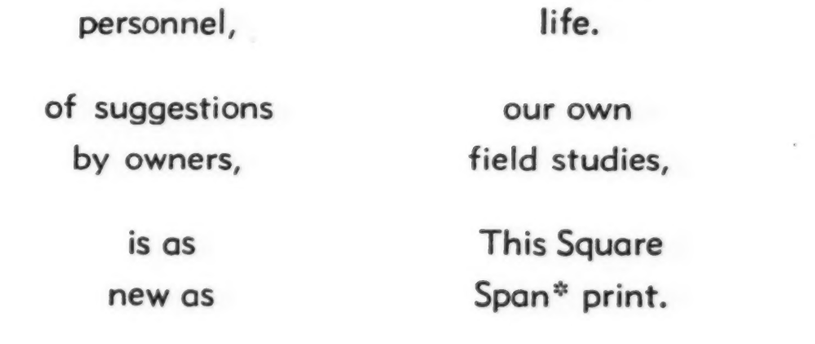
These changes are the result of suggestions by owners, our own field studies, and observations of others.

The Model B Longhorn is as new as This Square Span* print.

The new Longhorn Ditcher, like this new style printing, is more efficient.

Complete information and photographs will be ready when your inquiry reaches us.

*The above arrangement of print known as Square Span, at present the object of wide discussion, is the development of Robert B. Andrews, student editor, Southern Methodist University. Do you find it easy to read?



Longhorn Industries, Inc.

HENDERSON, TEXAS PHONE 1035

gas sold to six distributing companies in New York state by $217,000 annually. By its action, FPC has permitted the increase to go into effect as of Aug. 1.

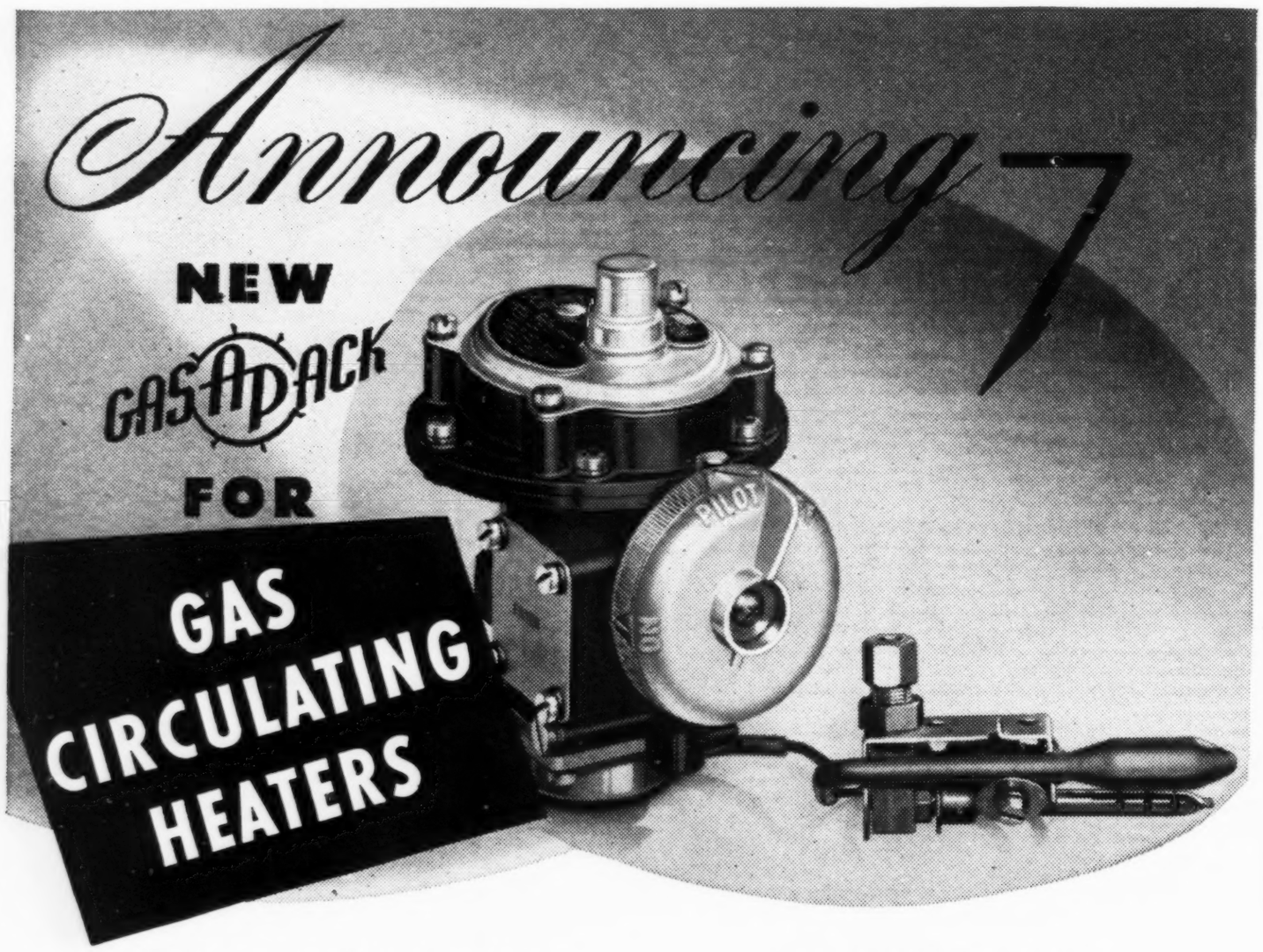
The commission staff has recently completed an informal study of Home Gas' rates, wherein it was found that the company's earnings based on a test period were $248,000 below the amount required to provide a 6% return on investment.

The six distributing companies to be affected by the rate increase are two Home Gas subsidiaries (Binghamton Gas Works, and Keystone Gas Co. Inc.), and Empire Gas & Fuel Co. Ltd., New York State Electric & Gas Corp., Rockland Gas Co., and Rockland Light & Power Co.

OHIO ASKS TARIFF CHANGE

Ohio Fuel Gas Co. has applied to the Federal Power Commission for a change in tariff covering its rate for wholesale service which would amount to a rate increase of $1.2 million annually, based on anticipated sales. This is one of the largest rate increases ever proposed to the commission by a gas utility company.

Ohio Fuel said the proposed increase, amounting to about 4.2 cents per Mcf, is necessary because intense postwar demand has necessitated changes in source of supply —which required expenditures totaling $25 million for production and transmission facilities.



ONE Compact Unit Combines Pressure Regulating Valve, Filter, and Safety Pilot.

- 100% Safe Lighting
- 100% Fail-Safe Operation
- Simplifies Factory Assembly and Field Installation
- Handles ALL Gases
- Reduces Control Costs
- Immediately Adaptable to Automatic Temperature Control
- Quiet

New GASAPACK Model 54 All-In-One Gas Control for Gas Circulating Heaters.

Here's the Gas Circulating Heater Control that obsoletes all other controls! The new GASAPACK replaces, in a *single* unit, the multiple control set-up usually including an A-cock, B-cock, filter, main valve, pilot valve, and pressure regulator. You have only ONE unit to mount on your heater, only ONE piping connection in the field. You're assured of improved heating efficiency, too. GASAPACK operates positively, noiselessly, holding a constant flame for steady heat. Includes every safety feature for safe lighting and fail-safe operation.

Add this new compact, trouble-free "All-In-One" GASAPACK to *your* gas circulating heaters — for savings and improved customer satisfaction. WRITE TODAY FOR COMPLETE INFORMATION.

PROTECTED GAS CONTROLS PERFORMANCE

EASY TO ADD AUTOMATIC TEMPERATURE CONTROL

A new A-P Thermostatic Heat Regulator Set made especially for the GASAPACK may be supplied at the factory or sold as an easily-installed accessory by your dealer — for extra profit.

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DEPENDABLE *Controls*
FOR HEATING . . . AIR CONDITIONING . . . REFRIGERATION

REGULATION

NATURAL GAS ACT BILL FATE STILL UNDECIDED

The House of Representatives passed the Harris bill last month, in a move that will exempt independent gas producers from FPC jurisdiction where "arm's length" or competitive-market sales of natural gas to unaffiliated pipeline companies are involved. The lower chamber of Congress overrode stiff opposition by a 183 to 131 vote.

Even a stiffer fight is seen for the bill in the Senate, however, where its chief sponsor, Robert Kerr of Oklahoma, must beat down charges by FPC commissioner-designate Leland Olds that the action will result in uncontrolled increases in gas prices at the burner tip. Senatorial leanings, it is reported, are split on the controversy to such an extent that a handful of votes switching from one side to the other would determine victory or defeat.

The House found it necessary to defeat several attempts to broaden or narrow the bill by amendment before passage of the original proposal. Republicans, together with southern and southwestern democrats, and backed by Speaker Sam Rayburn of Texas, formed the bloc that okayed the bill in its present form.

President Truman and the administration let it be known that they were violently opposed to Senate passage of the measure—veiled threats of a veto were seen by senatorial proponents of the Kerr bill, a twin-brother of that passed by the House.

Along with prospects of a violent controversy when the bill reaches the floor of the Senate was the probability that it won't reach the floor at all this session. Vital appropriations and high-priority international issues still jam the agenda—and with pressure for adjournment growing each day, even proponents of the bill to free independents from possible FPC control admit that there is, at best, a small chance that the upper chamber will act on the matter during the current term.

FPC REBUTS HOOVER REPORT

The Federal Power Commission released a 34-page rebuttal last month on the report by the Hoover Commission (in its report of regulatory commissions and the Department of Interior), in which the Hoover group submitted that regulatory commissions are essential sub-units of the executive branch of government and hence should come under closer executive control.

Quoting extensively from legislative and administrative history, FPC showed that the appointment of regulatory commissions was a direct result of the overburdening of the legislature with regulatory matters which were under its jurisdiction before the establishment of the regulatory groups. Further, said the commission, the original and prevailing opinion that the independent commissions are creatures of the legislature is consonant with the constitutional theory of dividing authority in the check-and-balance system of the legislature, executive, and judicial departments of government.

MISCELLANY

18 GAS COMPANIES CITED FOR FINANCIAL REPORTS

Eighteen gas utility companies have qualified for *Financial World* magazine's "Highest Merit Award" in the publication's annual contest of financial reports of businesses. Some 4200 annual reports, submitted for the year 1948, were included in the judging.

Both natural and manufactured gas companies were included in the 18 merit-award group, including: Brooklyn Union Gas Co., Hartford Gas Co., Laclede Gas Light Co., Peoples Gas Light & Coke Co., Providence Gas Co., Suburban Propane Gas Co., Washington Gas Light Co., Columbia Gas System, Consolidated Gas Utilities Corp., Consolidated Natural Gas Co., El Paso Natural Gas Co., Houston Natural Gas Corp., Kansas-Nebraska Natural Gas Co., Lone Star Gas Co., Mobile Gas Service Co., National Fuel Gas Co., Natural Gas Pipeline Co., and Northern Natural Gas Co.

Thus the stockholders' reports of these companies advance into contention for the final judgment of the contest—two of them will be adjudged "best of industry" in their classification and will be awarded "Oscars of Industry."

In 1948's contest, Peoples' Gas Light & Coke Co., Chicago, won the manufactured gas section, and the Columbia Gas System was adjudged winner of the natural gas section.

NEW AGA LAB PROCEDURES

New developments in techniques and methods employed in the AGA Testing Laboratories in Cleveland and Los Angeles will greatly simplify and speed testing of gas appliances, AGA researchers announced recently.

Briefly, the changes that have been instigated are:

1. More manufacturers can be accommodated at the Los Angeles laboratory because of increased facilities. Manufacturers in the area between the Rocky mountains and the Mississippi river are being invited to send their products West for testing, instead of to Cleveland, as in the past.

2. A new policy of accepting appliances on a reservation basis as discussed in August *GAS*, page 57.

3. Laboratory procedures and methods in general have been investigated and overhauled. Included was appointment of a Chief Methods Engineer, who will translate formulated appliance standards into the test methods employed to determine compliance therewith. He will also serve as a liaison officer between AGA's Approval Requirements committee recommendations and the laboratory personnel charged with making them standard procedure.

BRYANT SERVICE SCHOOL

Bryant Heater Division (Affiliated Gas Equipment Inc.) is conducting the second in its series of service schools at company headquarters in Cleveland.

The first session, recently completed, handled a capacity attendance for its classes in the fundamentals of heating, analysis of gases, adjustment and servicing of heating controls, and servicing and installation of Bryant equipment. Dual-fuel operation, quality control, and volume water heating were also pointed up for instructees.

NEW DESULFO UNIT READY

The Dallas office of Stacey-Dresser Engineering has announced that another of the company's Desulfo units is now in production.

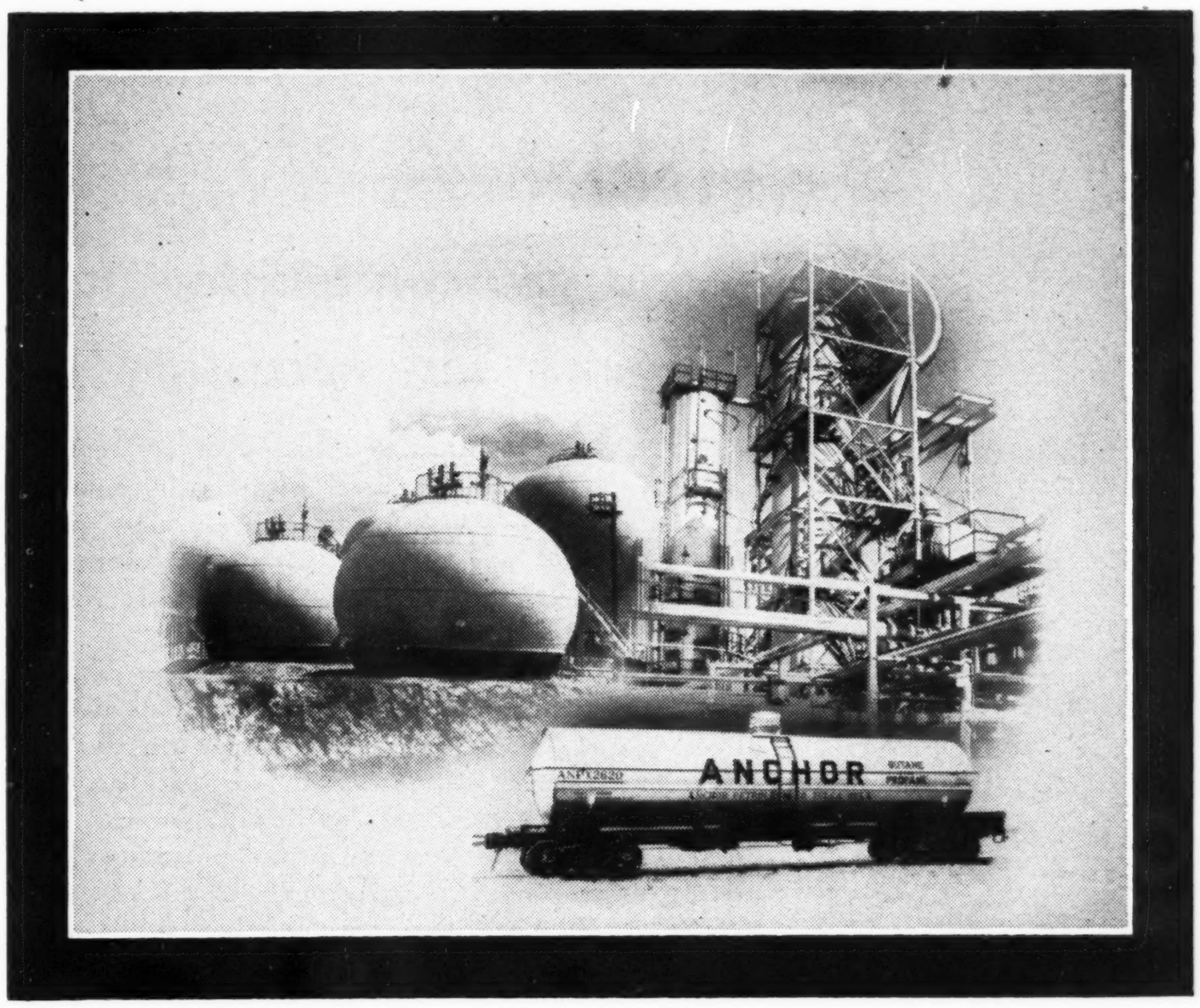
The unit, contracted for by the Hoosier Gas Corp. in Vincennes, Ind., will be in operation in September, and will process up to 3 MMcf of gas daily, reducing the hydrogen sulphide content of the gas to one grain per 100 cu ft.

INFORMATION PLEASE

Max W. Ball, Washington, D. C., oil and gas consultant, has sent out a request for additional information on gas storage fields.

Mr. Ball, in "Underground Gas Storage," the paper he presented at the AGA natural gas department's spring meeting at French Lick, Ind., listed some 80 storage fields in existence, as well as 14 in stages of preparation. Since delivery of the address in May, Mr. Ball has learned of three additional storage fields in existence, and sees the possibility that there may be more.

GAS requests that industry men who have information as to location and ownership of storage fields not included in "Underground Gas Storage" relay such information to Max W. Ball, 1025 Vermont Ave., N.W., Washington 5.



call anchor first

LP-Gas for: Stand-by Plants - Peak-load Demands - Industrial Plants - Cities and Towns

From our strategically-located plants we are able to give quick delivery on high-quality ANCHORGAS, Butane-Propane. Shipments by rail, water, or transport. For dependable gas service, call us before you renew your contract. Ask about Anchor's special contract.

ANCHOR PETROLEUM COMPANY

Atlas Life Bldg. Tulsa, Oklahoma

NEW PRODUCTS

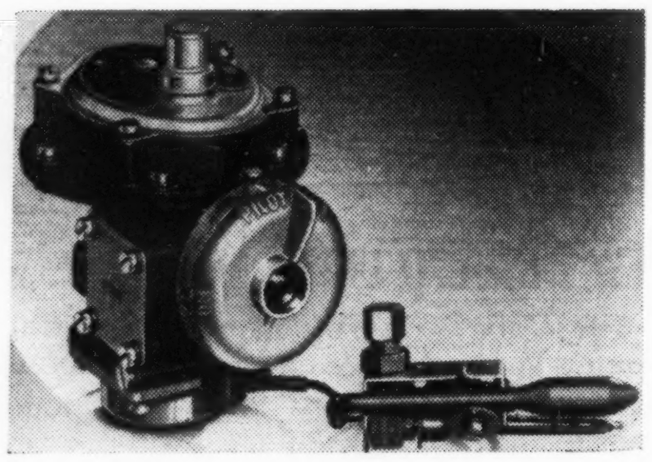
Heater Control

AUTOMATIC PRODUCTS CO., 2450 N. 32nd St., Milwaukee 10, Wis.

MODEL: A-P Gasapack single-unit control.

APPLICATION: For gas-fired space heaters and circulators.

DESCRIPTION: This AGA-approved control features a built-in pressure regulator valve, large capacity filter, and safety pilot. It is equipped with a composition disc which provides positive seal-off with any type of gas. The pilot valve must be fully heated



by the safety pilot before it will allow full-flame gas delivery, and if for any reason the main burner or pilot flame go out, the pilot valve will immediately cut off the gas supply.

The control is equipped with a 2-lb air capacity filter that eliminates gumming. It is completely silent and may be adapted to thermostatic heat control at the factory or by dealers in the field.

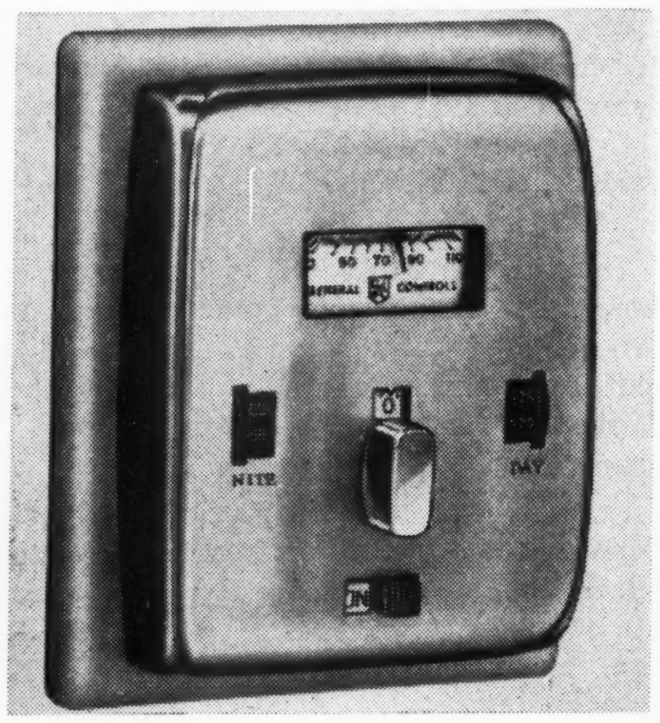
Timer Thermostat

GENERAL CONTROLS CO., 801 Allen Ave., Glendale 1, Calif.

MODEL: T-70 Timer-Thermostat.

APPLICATION: Provides remote control of both day and night temperature periods and can be used in connection with any space or unit heaters; central, wall or floor furnaces equipped with automatic control systems.

DESCRIPTION: This device is a two-wire, bi-metal type, with snap-action controls and easy-to-set drum dials. It is sensitive to radiant



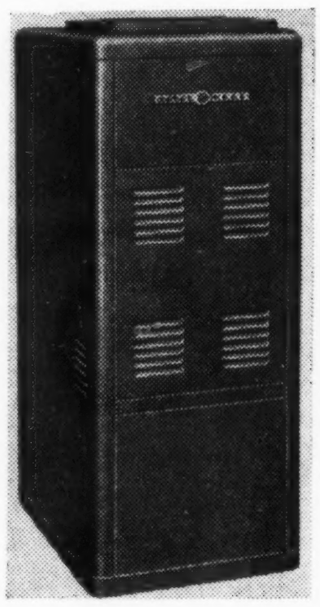
or connected heat since the metal cover is an integral part of the temperature element. Any desired temperature between 50° and 90° F may be selected for night period. Clock mechanism automatically returns heating system to preselected day temperature each morning.

Two models are available, one providing external day and night settings and the other providing external day setting and internally adjustable night setting. Cover is side-hinged for easy accessibility. It is also provided with an on-off switch. The thermostat extends only 1½ in. from the wall.

Air Conditioner

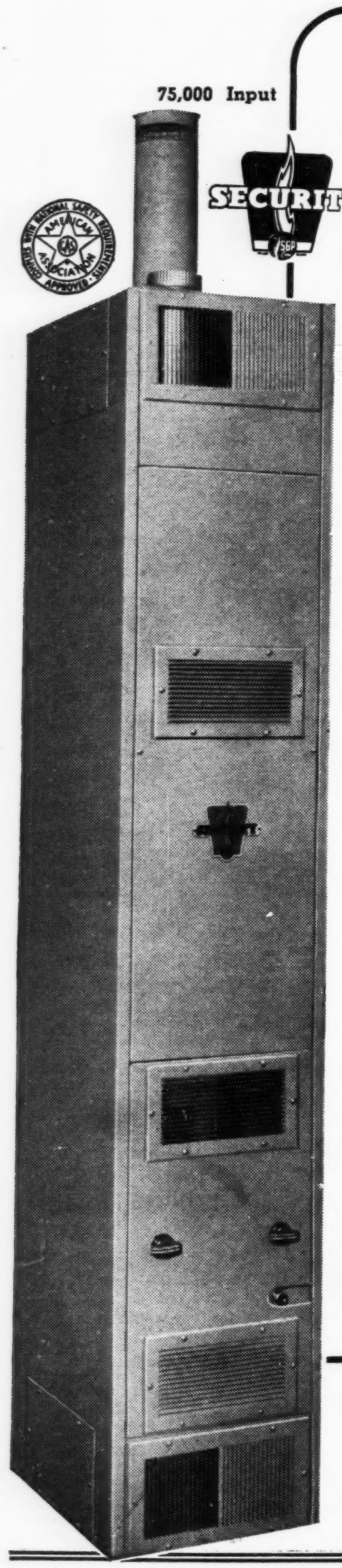
NORGE HEAT DIVISION, Borg-Warner Corp., Detroit 26, Mich.

MODEL: F500-95 with an input AGA rating of 93,750 Btu and the F500-110 with an input rating of 109,375 Btu.



APPLICATION: Designed for installation in utility rooms, closets, and basements.

DESCRIPTION: Standard equipment on these winter air conditioners includes automatic pilot valve, manual main control and manual pilot valve, gas pressure regulator, and magnetic type solenoid with



NOW...

a TRULY Forced Air

INN-A-WALL

...and you can employ duct work where necessary!

YES, sir . . . here is *the* answer to heating properly small homes without basements. Security's INN-A-WALL is an entirely new principle in forced air heating! Requires minimum duct work . . . may be used without ducts. Needs only 16 by 20-inch floor area.

The INN-A-WALL reverses the usual flow pattern . . . warm air comes out the *bottom*. This means *warm floors!* Warm air can be taken from all four sides . . . return air, from all sides at the top. Where ducts are required for distant rooms, permanent connection is made at the bottom. Completely assembled . . . ready to install. Casing height, 88 inches. Security breather tube automatically supplies air for combustion.

Other outstanding INN-A-WALL values are • Quiet positive blower • Fully automatic • Special Security high-efficiency burners • Complete adaptability to any floor plan (may be placed in wall or stand alone) • Amazingly economical in price.

SECURITY

Automatic, Gas-Fired

INN-A-WALL FURNACE

Write Today . . . don't delay. Get all the facts about this revolutionary new furnace.

SECURITY MANUFACTURING CO.

1630 OAKLAND STREET • KANSAS CITY 3, MISSOURI

100% safety shutoff controls for LP-Gases. The unit has a built-in draft diverter. A new type Vee-Sectional heat exchanger provides fast heat transmission through the use of jet-type gas passages. A top discharge with bottom, back or side cold air return is provided, and a factory finished duct is available for basement installation.

Wall Heater

HOLLY MANUFACTURING CO., 375 S. Arroyo Parkway, Pasadena 2, Calif.

MODEL: 45-WD-Series 14.

DESCRIPTION: This circulating type heater fits in a standard 4-in. stud wall requiring an opening of 14 x 50½ in. Equipped with 100% safety shutoff, it is fully shielded with a baked enamel panel. The heater is mounted off the floor, eliminating need for carpet cutting or altering floor joists, and facilitating cleaning. Return air is taken in at bottom of panel, insuring complete circulation of warm air. Clearflo louvers, a standard Holly feature, direct warm air away from the wall and into the room.

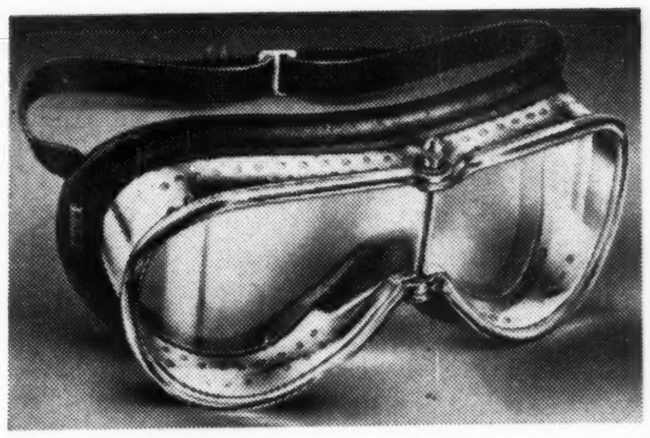
A CONSOLIDATED EDISON CO. of New York employee demonstrates freedom of movement allowed in this mask that the firm's emergency men and gas and electric station personnel now use in oxygen-deficient atmospheres. More than 1200 ConEd men have been trained in the use of the mask, known as Chemox. It was developed during the war for Navy fire-fighting teams by Mine Safety Appliances Co., Pittsburgh, Pa. The mask generates its own oxygen without any outside connections.

Goggles

AMERICAN OPTICAL CO., Southbridge, Mass.

MODEL: AO Panoram Goggle.

DESCRIPTION: This goggle is available with rubber cushions to provide extra wearing comfort. The cushions are molded to the exact shape of the eyecup and can be slipped into place easily with no need for stapling, sewing, or cementing. Once in place, they stay, but they can be replaced in a few seconds. Made of soft, pliable, non-toxic, neoprene sponge rubber, the cushions assure extra protection against dust and flying particles.



The company also has announced a new, pouch-type plastic case to protect Panoram goggles from scratches, dust and dirt when not in use. The case has heavily stitched, reinforced edges and a flap with a snap hook. Large enough to enclose the goggle completely, the case is so flexible that it can be tucked away in a worker's pocket.

Heater Range

CRIBBEN & SEXTON CO., 700 N. Sacramento Blvd,. Chicago 12, Ill.

MODEL: Universal Sheraton.

DESCRIPTION: This gas cooking-gas heating range features an oversized combustion chamber for rapid room heating, complete safety control and temperature regulation with a Robertshaw Unitrol unit, and the exclusive

ARCCO
ARCCO-ANUBIS
GAS
GRAVITOMETERS
DIRECT WEIGHING
DIRECT READING
—No Computations
Once calibrated and properly installed this Gravitometer requires no further attention. Hundreds are in daily use in pipelines and refineries of major companies. There are no electric motors, pressure regulating valves or other complex arrangements; is practically frictionless, thus minute changes in specific gravity are recorded as they occur. Years of use have proven that Arcco-Anubis Gas Gravitometers remain accurate and highly responsive even under severe conditions of service. Also, available in double column "dry air" type which automatically corrects for humidity content of the air. Send for bulletin No. 101.
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Available for Early Delivery
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ANNOUNCING

the new

Hendy "60"

Made by the makers of the famous Henderson "Clipper" furnace (Blower-type Gas Heating exclusively)

Compare the Value

60,000 B.t.u. input

Big in performance, small in size. Fully-automatic, high-quality, duct-type forced air heating—at a cost competitive with ordinary heating methods for smaller homes!

- FRONT VENT saves space, makes installation easier in closet or corner. Dimensions: 52" high, by 18" x 30".
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Write or wire for catalog-sheet, prices, dealer opportunities

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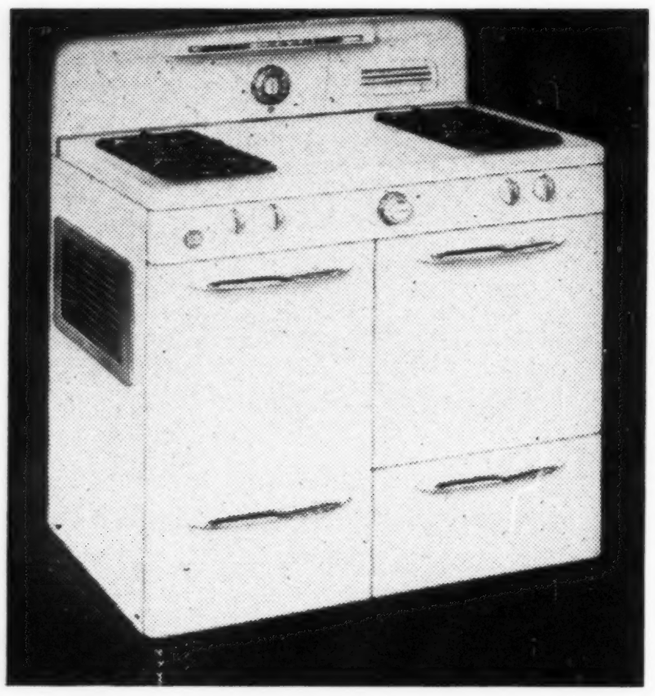
CLIPPER · CLIPPERETTE · HENDY "60"

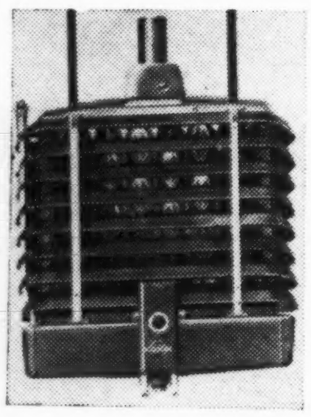


"Whirlpool" smoke-proof broiler pan. Rated capacity is 28,000 Btu for natural, mixed or LP-Gas and 31,000 Btu for manufactured gas.

Overhead Heater

DAY & NIGHT DIVISION, Affiliated Gas Equipment Inc., Monrovia, Calif.

MODEL: Overhead Panelray.



DESCRIPTION: This heater utilizes infrared rays which travel in a straight line at the speed of light and cannot be diverted by drafts or air currents. It will heat entirely exposed areas or enclosed spaces frequently exposed to outside elements. When used in buildings which are entirely enclosed, the air is heated as quickly as with any other type of heater, and warm floors and working areas are kept comfortable by the direct infrared rays. Cold spots are eliminated. The suspended unit occupies no usable space, is automatic, completely vented and AGA approved.

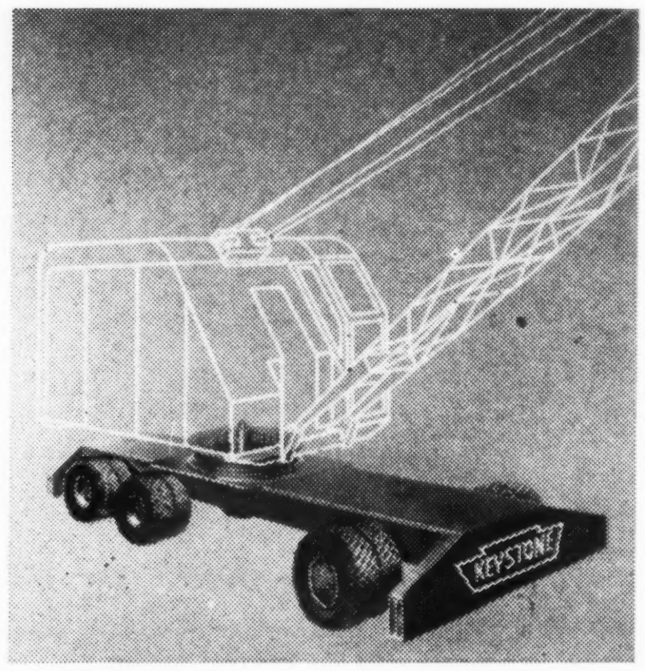
Crane Mounting

KEYSTONE DRILLER CO., Equipment Division, 419 Wood St., Pittsburgh 22, Pa.

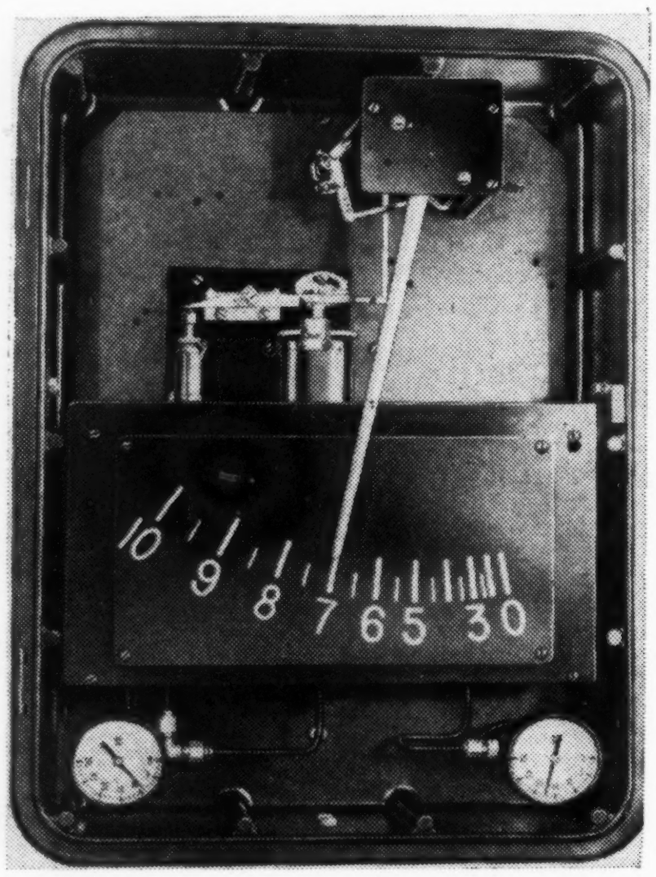
MODEL: Krane Karriage.

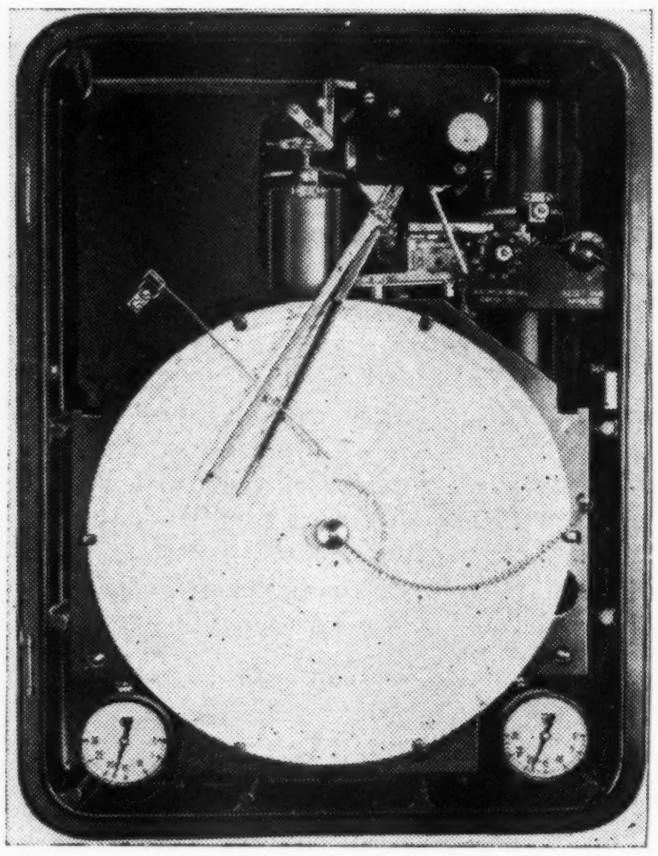
APPLICATION: For mounting all makes of cranes from 10 to 25-ton capacity.

DESCRIPTION: Propulsion power is obtained through the travel clutches and vertical travel shaft of the crane. The Karriage is equipped with a 4-speed transmission with



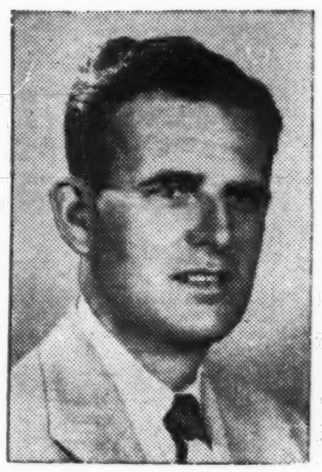
a range from 2 to 10 mph in either direction. There is complete control of the machine from the cab regardless of its position on the Karriage. Short turning radius for narrow roadways makes it ideal for close work. Air operated brakes on all wheels and hydraulic steering assure complete, safe control of the rig. Karriages may be obtained to convert crawler or rail type cranes to rubber tired mountings.





AMERICAN METER CO., 60 East 42nd St., New York, N. Y., has announced its new Series A-88 pneumatic instruments for transmitting and controlling flow, pressure, liquid level, and specific gravity. Shown here are partial interior front views of the pneumatic transmitter (left) and the proportional reset controller-receiver. The number of pivot points and moving parts has been reduced, and by unitizing sub-assemblies and standardizing parts, a high degree of interchangeability has been achieved. Instruments in the line are arranged so that they can be reversed by shifting one end of one link.

F. S. Cornell
. . . A. O. Smith



James J. Condon
. . . Peoples Gas

W. A. Kohlhoff

James F. Bell
. . . Portland Gas & Coke

Charles B. Barry
. . . Blaw-Knox

W. A. Marsteller
. . . Rockwell

PEOPLE

F. S. CORNELL has been named manager of the Water Heater Division of the A. O. Smith Corp., Milwaukee. Mr. Cornell had been assistant manager of the division, which operates the Kankakee, Ill., Works of the company. Before moving to Kankakee, he served on a variety of manufacturing, planning, research and sales committees at the Milwaukee Works.

JAMES J. CONDON has succeeded the late Thomas J. Gallagher as manager of the commercial sales department of The Peoples Gas Light & Coke Co., Chicago. Mr. Condon has been employed by Peoples Gas for 18 years, serving as a heating engineer in the domestic sales department during most of this time. He was named assistant manager of the commercial sales department last September.

JAMES F. BELL, assistant to the president of Portland (Ore.) Gas & Coke Co. since joining the company in 1946, was elected vice president at the annual meeting of the board of directors. Mr. Bell is supervising the operating functions of the company and the development and sale of by-products. He also continues as assistant to the president. W. A. KOHLHOFF, who took over E. L. Hall's duties as chief engineer when Mr. Hall became ill last year, continues in that position. He had been associated with Ebasco International Corp. from 1935 until he joined the Portland utility early in 1948.

CHARLES B. BARRY has been appointed chief engineer for the oil and gas department of the Chemical Plants Division, Blaw-Knox Co., Pittsburgh. The division was recently expanded through the addition of personnel and the opening of a district office at Tulsa. Mr. Barry, who was process engineer for Jones & Laughlin Supply Co. for the past three years, will have his headquarters in the new office. CARL E. BAIRD has been appointed sales representative for the firm's Tulsa office. He was employed by Pittsburgh Equitable Meter Co. and the Bureau of Mines before joining Blaw-Knox in 1946.

WILLIAM A. MARSTELLER, Chicago, and ROBERT P. MELIUS, Milwaukee, have been named vice presidents of Rockwell Manufacturing Co., Pittsburgh. Mr. Marsteller has been manager of advertising and market research for the company, as well as vice president of Edward Valves Inc., East Chicago, Ind., a subsidiary. Mr. Melius recently was placed in charge of sales for the new power tool division of Rockwell. He has been with the firm's Delta manufacturing division for 19 years, as sales manager since 1935.

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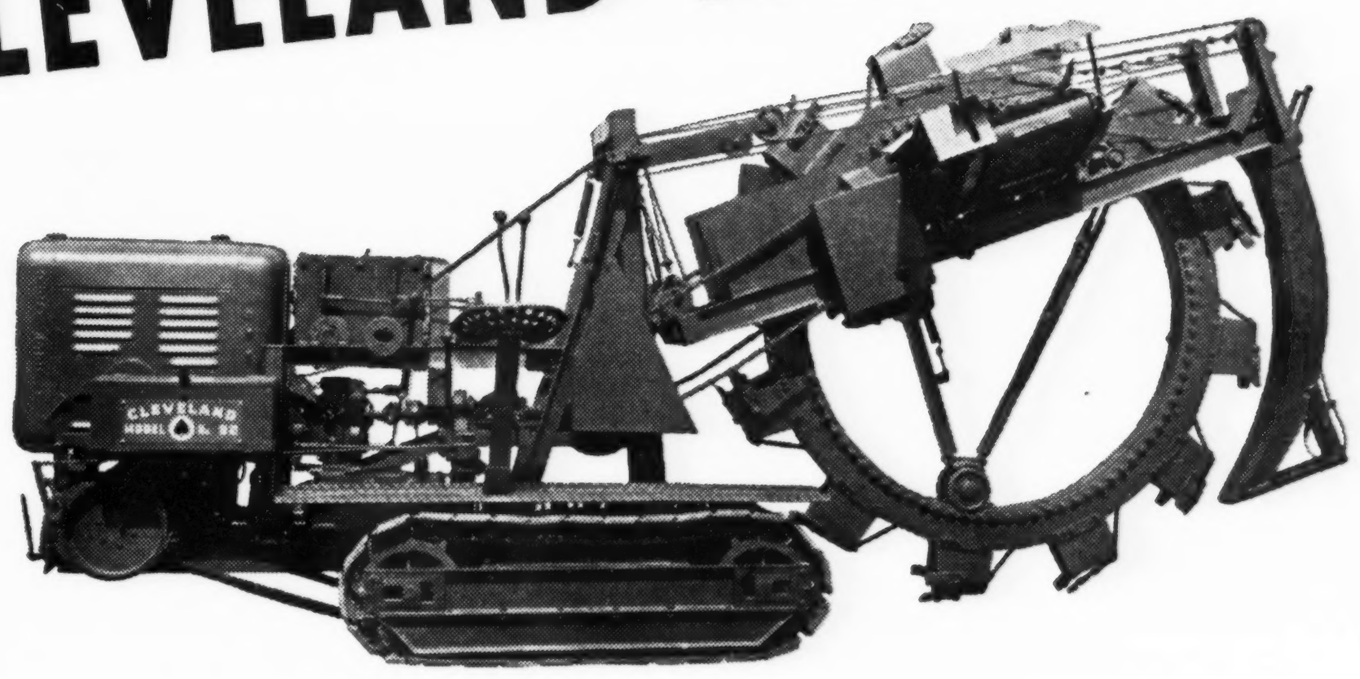
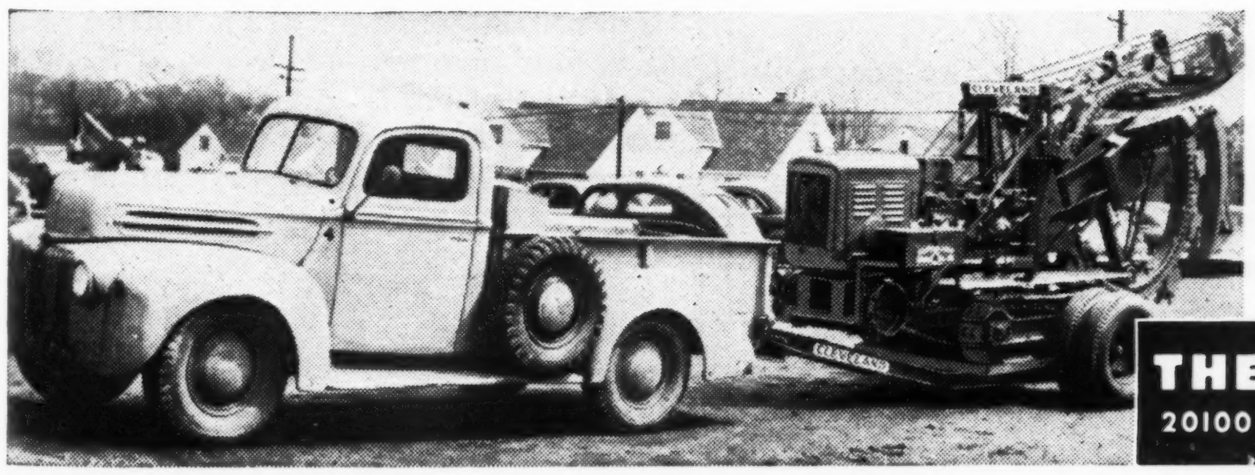
CLEVELAND TRENCHER

THE BABY DIGGER
Model 92

A SMALL—COMPACT—FAST—STURDY TRENCHER

WITH TRENCH CAPACITIES OF 10" TO 20" WIDE, 0' TO 5' DEEP

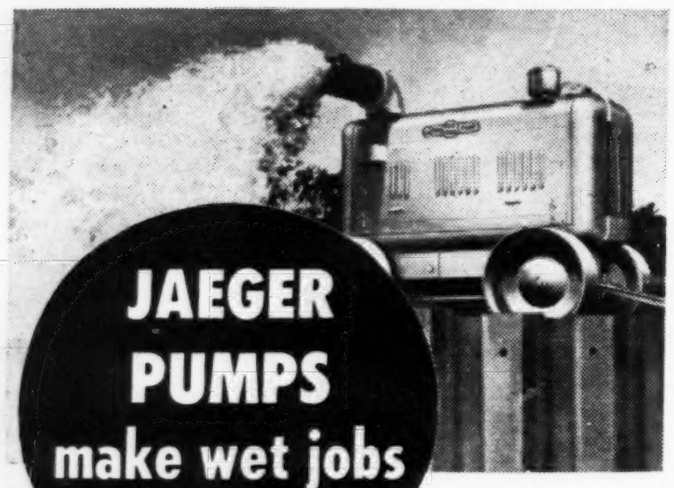




SEND YOUR REQUESTS TO YOUR LOCAL CLEVELAND DISTRIBUTOR OR DIRECT TO THE FACTORY

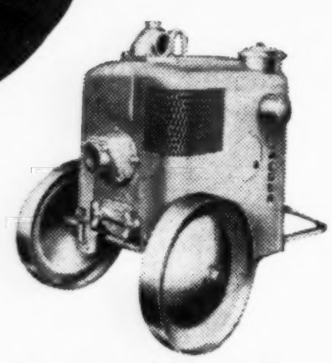
THE CLEVELAND TRENCHER CO.
20100 ST. CLAIR AVENUE • CLEVELAND 17, OHIO

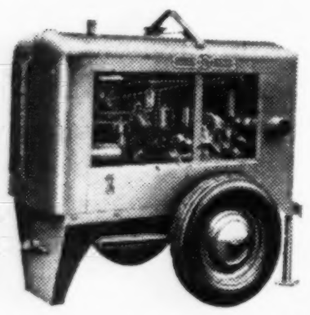
New 2" aluminum pump weighs 105 lbs., pumps 9000 gph . . . Gives high head performance for price of low head pump.



JAEGER PUMPS make wet jobs dry

Extra power and double priming action to de-water faster. Built to outlast cheaper pumps by thousands of hours.





Heavy duty 2" to 10" models for low or high head requirements. Super-Jet pumps for pressures to 275 lbs. Diaphragm and caisson pumps. Get catalog.

THE JAEGER MACHINE COMPANY
Columbus 16, Ohio

IMPROVED
SERIES 14
Gas Combustion Control

- Operates the BOILER UPTAKE DAMPER
- Uses only 10 CFH of air
- PRECISOR equipped
- Uses butterfly bodies with LOW PRESSURE DROP
- FLOW CHARACTERISTICS match the damper
- Can be furnished with INTEGRAL MOUNTED MASTER PILOT
- Installed in the gas line as ONE COMPLETE UNIT
- NEW LOW PRICES— PROMPT DELIVERIES

For SERIES 14 CONTROL Information Write—

—THE—
WEBSTER ENGINEERING COMPANY
P.O. Box 2168, Tulsa, Okla.

WALTER E. BIMM has been named assistant sales manager of the George D. Roper Corp., Rockford, Ill. T. J. REYNOLDS JR. has been appointed manager of the service department and R. A. KOEHLER JR. will assist District Manager R. E. MacINTOSH in the New England territory. MAX G. ZELLER will work with J. M. PHILLIPS, St. Louis and eastern Missouri division manager, and PHILIP D. KELLNER will work with Division Manager R. R. CHAPMAN in Chicago.

CHARLES A. YOUNG, who has represented American Stove Co. in the New York area since 1910, retired on Sept. 1 from his position as eastern sales division manager. Mr. Young was employed by Western Electric Co., Chicago, from 1903 until 1910. GEORGE P. VELTE, manager of the company's Boston office since 1930, has replaced Mr. Young, and J. J. EDWARDS, of the firm's central sales division in Cleveland, has been transferred to Boston.

RONALD G. JOHNSON has been appointed sales promotion manager of the Florence Stove Co., Gardner, Mass. He will head a newly created department which is part of the company's sales expansion program. Mr. Johnson joined Florence four years ago as assistant advertising manager. CHARLES O. SLABY has been appointed sales manager of the company's heater division, a new position.

A. T. CARROW has been appointed midwest sales division manager of Cribben & Sexton Co., Chicago. J. G. SCHELLENBERG, who formerly held this position, has been named sales manager of the central division. Mr. Carrow will headquarter in Omaha and Mr. Schellenberg in Chicago.

DR. G. M. MARINO, authority on Latin American trade problems, has been named to handle the organization, distribution and marketing of Oronite Chemical Co.'s products in Latin America. Dr. Marino will make his headquarters in San Francisco.

L-P GAS
DESIGN
EQUIPMENT
ENGINEERING
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UNITED PETROLEUM GAS COMPANY
806 ANDRUS BLDG., MINNEAPOLIS 2, MINN.

MANAGER FOR NATURAL GAS COMPANY

City of approx. 2500 meters. Must be experienced distribution engineer with thorough knowledge of the selling of all types gas appliances both domestic and industrial. Substantial salary plus bonus for load building. Give complete detail of experience and references; also state age and salary expected. All replies will be held confidential.

BOX 250, GAS Magazine
198 S. Alvarado St., Los Angeles 4, Calif.

W. REED MORRIS has retired as vice president and general manager of the Gas & Coke Division of Koppers Co. Inc., Kearny, N. J. Mr. Morris has been associated with the company for 34 years and is considered an outstanding authority on the manufacture of gas and coke. He has opened offices in the Empire State Building and will serve as Koppers'

W. R. Morris

M. T. Herreid

consultant to the gas and coke industry. MYRON T. HERREID succeeds Mr. Morris as vice president and general manager of the Koppers division, and division headquarters has been moved from Kearny to Pittsburgh. Mr. Morris also has relinquished his duties as eastern representative of the entire company. This function has been assumed by K. R. HARE, manager of the firm's plant at Kearny.

Mr. Hare has announced the appointment of PAUL C. McCONNAUGHEY, personnel manager of the Gas & Coke Division, as assistant manager of the Seaboard plant at Kearny. H. J. MEREDITH was named chemical engineer for that plant and L. W. SCHMIDT engineering technician. HAROLD F. EBKEN is the new personnel manager for the Gas & Coke Division, M. W. GAYLORD is production manager, and J. E. SPEARS will continue as control manager of the division.

R. A. BISSELL has recently been promoted to sales promotion manager of Bryant Heater Division, Affiliated Gas Equipment Inc., Cleveland, Ohio. Mr. Bissell became associated with Bryant Heater Co. in 1945, having spent 13 years as district heating supervisor for Brooklyn Union Gas Co. He will coordinate Bryant sales promotion activities for the entire United States.

WILLIAM H. CORWIN has been appointed public relations director of Taylor Instrument Co.'s Rochester, N.Y. Mr. Corwin joined the organization in 1942 as a member of the advertising department. Since 1943 he has edited the company's publication, *The Taylor Meteor,* and has prepared other company literature.

HORACE J. SMITH, president of Ward Heater Co., Los Angeles, received his M.A. in history from the University of Southern California in June. Mr. Smith was the oldest member of the "graduating" class, having received his bachelor's degree from Harvard in 1913.

THOMAS W. PATTERSON, mechanic for the AGA Laboratories, Cleveland, Ohio, retired from active service on July 1. He was the first laboratory employee to retire under the association's pension plan.

HERBERT H. McMURRAY, advertising manager of Washington (D.C.) Gas Light Co., has been appointed to the new position of residential sales manager for the utility. Mr. McMurray is succeeded by ROBERT H. LEWIS, former residential sales manager of Washington Gas Light Co. of Montgomery county, Md., a subsidiary. C. C. DILLINGHAM, residential sales manager of the Washington utility, is now merchandise sales manager.

J. H. CAMPBELL, division manager of Consumers Power Co.'s Grand Rapids, Mich., division since 1947, has been appointed assistant to the president and transferred to the firm's general offices in Jackson, Mich. GEORGE W. RICHEL, Mr. Campbell's assistant for the last two years, was appointed to succeed him as division manager. W. R. CARLYON, assistant to Lansing Division Manager Howard Pett, was appointed manager when Mr. Pett retired.

ELMON L. HALL, vice president of Portland (Ore.) Gas & Coke Co., retired on June 30. Mr. Hall became ill last summer and was unable to work for about six months. Since last February, however, he had been at his desk part time every day. He joined the company in 1906 as assistant to the late Hilmar Papst during conversion of one of the firm's works from coal to oil. Mr. Hall was successively assistant superintendent, general superintendent, chief engineer in charge of production and distribution operations, and vice president. He was active in the American Gas Assn. and the Pacific Coast Gas Assn., serving as president of the latter in 1925, vice president in 1924, director for four terms, and chairman of the technical committee for three years. In 1910 and 1926 Mr. Hall was awarded the PCGA gold medal.

Elmon Hall

D. C. MEYER, manager of Valley Cities Gas Co., Sayre, Pa., and The Gas Light Co. of Waverly (N.Y.), resigned recently. He has been succeeded by GEORGE F. WELLS JR., former general manager of all properties of the Pennsylvania & Southern Gas Co., Westfield, N. J. The Sayre and Waverly utilities are the largest operating units in the Pennsylvania & Southern system. C. MacDONALD SWAN has taken over Mr. Wells' former post.

GAYLORD W. SCHULTZ has been appointed Middle West regional manager and JAMES H. ELDRIDGE district sales manager of the Timken Silent Automatic Division, Jackson, Mich. Mr. Schultz will headquarter in Kenosha, Wis., with the Northwest as his territory, and Mr. Eldridge's territory will include North and South Dakota and portions of Iowa and Minnesota.

HOWARD E. ORTON, manager of the Endicott-Oswego district for New York State Electric & Gas Corp., Ithaca, has been appointed to succeed WILLIAM H. McELWAIN as manager of the Binghamton division.

STAMANCO GAS PURIFIERS

STAMANCO Purifier Boxes are designed to your specific operating and service conditions--thus assuring utmost efficiency and economy. Made in any style or capacity. We design, build, and install STAMANCO Purifier Boxes complete with all trays, piping, valves, gantry cranes, and equipment for the economical handling of oxide materials. Let us figure on your requirements.

The STACEY MANUFACTURING Co.
SINCE 1851
CINCINNATI 16, OHIO
GAS HOLDERS • HI-PRESSURE TANKS • PURIFIER BOXES
ENGINEERS • FABRICATORS • CONSTRUCTORS
An Independent Organization Not Affiliated With Any Other Builders of Gas Holders

For "Leak-Proof" Connections
RECTORSEAL #2
In Easy To Use—BRUSH TOP Cans

RECTORSEAL #2 is a positive leak preventer for threaded, gasketed or coupled connections. It retains its plastic elasticity for the life of the connection . . . never sets hard or brittle . . . RECTORSEAL #2 has two consistencies: (1) Thin, in the can for easy application and ECONOMY. (2) Thick in the connection for PERFECT sealing.

RECTORSEAL #2 is impervious to all petroleum fractions (liquid or gaseous) . . . withstands extremes of pressure and temperature. It's a positive leak preventer.

Available in pint, ½ pint or ¼ pint brush-top cans. Ask your jobber . . . if he can't supply you, write direct to

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2215 Commerce St., Houston 2, Texas

RECTORSEAL # 2
Patented Trade Mark Reg. U. S. Pat. Off.
MAKING THE GAS INDUSTRY SAFER

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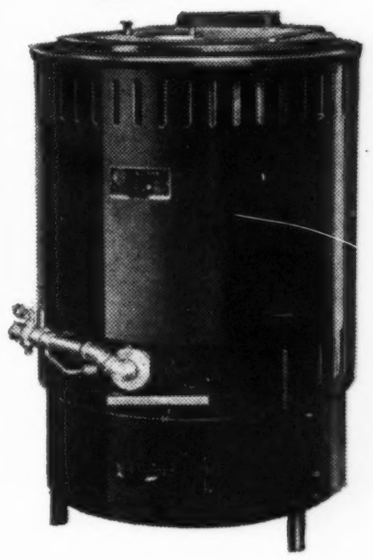

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COMPLIES WITH NATIONAL SAFETY REQUIREMENTS
AMERICAN GAS ASSOCIATION
APPROVED

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BUILDS BASE LOAD
Plus
Much better than average
MERCHANDISING PROFIT

A "MUST" for homes with automatic heat—needed in every home. Commercial size also available.

INCINOR SALES MAKE FRIENDS FOR GAS COMPANIES

Write for details.

BOWSER, INC., INCINERATION DIVISION
CAIRO, ILLINOIS

THESE EXCITING PEERLESS SALES AIDS ARE CREATING VAST CONSUMER DEMAND

NEWSPAPER MATS • DISPLAY CARDS • LETTER STUFFERS • CATALOGS

COME IN... and LET US SHOW YOU
The NEW Peerless FULLY VENTED CIRCULATORS
THIS IS NO TIME TO DREAM
Peerless GAS UNIT HEATERS
Peerless GAS HEATERS
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WHERE WIDE AWAKE DEALERS USE THESE EFFECTIVE SALES AIDS
Blizzard ??
HAVE THE COMFORT YOU WANT . . . THE
1949
Peerless
RADIANT GAS HEATERS
THIS IS NO TIME TO DREAM
DO YOU HAVE YOURS?....
ACT NOW—CALL YOUR DISTRIBUTOR OR WRITE US TODAY

PEERLESS MANUFACTURING CORP., LOUISVILLE 10, KY.

ROBERT H. EWING has been named district sales manager for the Empire Stove Co., Belleville, Ill., in the western Pennsylvania, Ohio, and West Virginia areas. Mr. Ewing replaces JACK QUALEY who has resigned because of ill health. Mr. Ewing will distribute Empire gas floor furnaces and circulators and the new Empire gas range. He will also represent the Morley Manufacturing Co., Mascouth, Ill., manufacturer of commercial gas cooking equipment.

J. ELIOT McCORMACK heads the new Transmission and Distribution Bureau recently set up by Consolidated Edison Co. of New York Inc. Mr. McCormack's title is chief distribution engineer, and he will be assisted by THOMAS C. DUNCAN, THOMAS MAXWELL, SEWARD A. WARNER, distribution engineers, and CLADD H. CHASE, superintendent.

PAUL R. DAVIS has been placed in charge of Arkansas Louisiana Gas Co.'s gas purchase and industrial sales, replacing F. S. KELLY JR., who resigned. Mr. Davis will work with R. O. GARRETT, chief production engineer for the Arkansas Louisiana Gas Co. and Arkansas Fuel Oil Co., on major gas purchase contracts.

GEORGE E. GILLIAM is now managing pyrometer supplies sales nationally for Brown Instruments Division of Minneapolis-Honeywell Regulator Co. Mr. Gilliam has been with the company for five years, most recently at South Bend, Ind. He will headquarter in Philadelphia, Brown Instruments' home office.

- OBITUARIES -

N. E. French

N. E. FRENCH, rate department manager of Duquesne Light and Equitable Gas Co.'s, Pittsburgh, died suddenly on June 14. Mr. French was an instructor in electrical engineering at the University of Wisconsin and later joined the staff of the Wisconsin Public Service Commission. In 1928 he became supervisor of rate analysis for Duquesne and Equitable and was appointed manager of the rate department in 1941. He was a member of the Edison Electric Institute and the American Gas Assn.

CHAUNCEY W. COOK, 82, director of construction of the by-products coke and gas plant of the Hudson Valley Fuel Corp., died Aug. 4 in Albany, N.Y. Upon completion of the construction work, he became secretary-treasurer of the firm. In 1929 Mr. Cook was elected vice president and general manager and later a director.

CHARLES A TUCKER, 94, died July 19 in Rochester, N. Y. The veteran utility executive was assistant treasurer of the Rochester Gas & Electric Corp. and had previously been affiliated with Syracuse (N. Y.) Light Co., New Haven (Conn.) Gas & Light Co., and Laclede Gas Light Co., St. Louis, Mo.

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Specialists in Appliance and Equipment Change-overs

If you plan to change the type of gas you are now distributing, contact us for our method.

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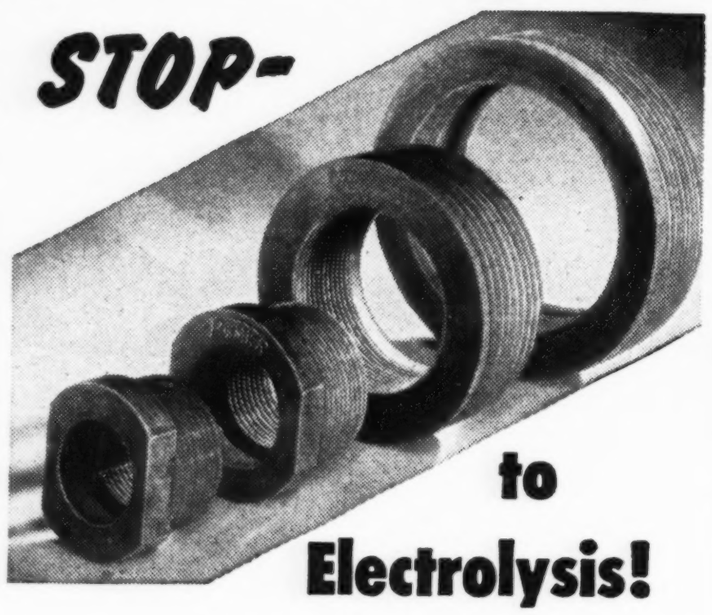

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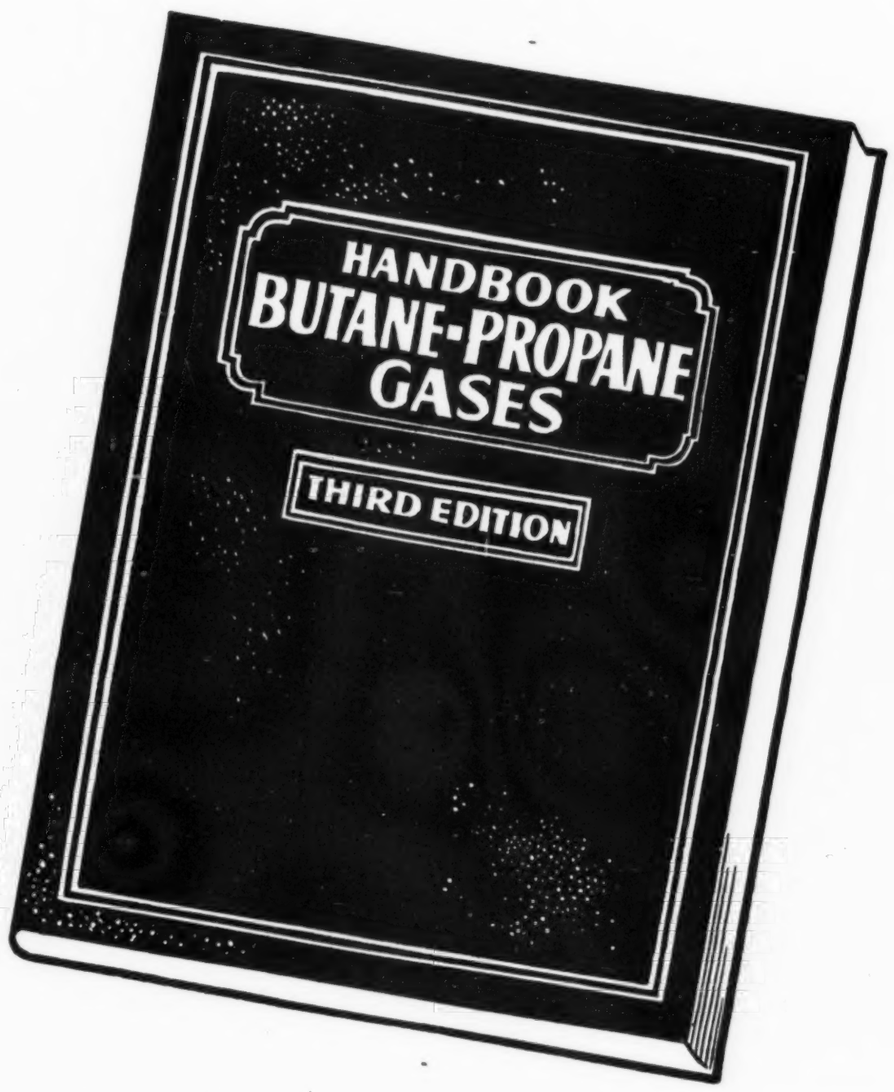

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Commercial Applications
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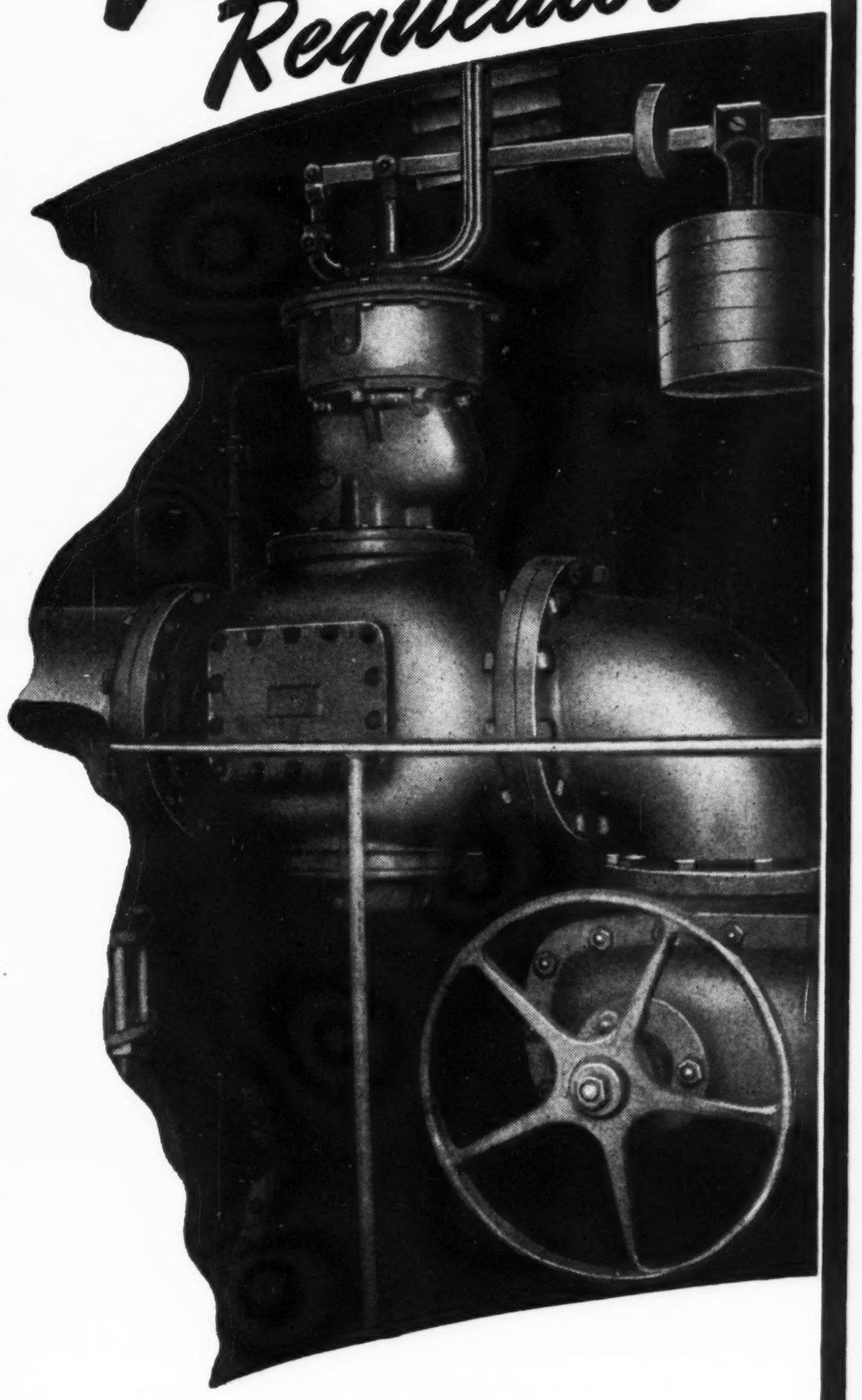
Reynolds KT Series Versatile Regulator



★ Reynolds KT Series Versatile Regulator is manufactured in a range of sizes from 2″ to 12″. It will reduce pressure to inches W. C.—or pounds to pounds. This Regulator can be used where space is limited, making it impossible to use the auxiliary bowl. In addition, Reynolds builds High Pressure Line Regulators with auxiliary bowl, when complete lockup is required. Let Reynolds adapt their new Versatile Regulator to your Gas Control System.

Reynolds GAS REGULATOR CO.
ANDERSON INDIANA U.S.A.

CATALOGS

PHILLIPS PETROLEUM CO., Bartlesville, Okla.—Bulletin 172, titled "How Your Gas Utility Can Use Phillips Liquefied Petroleum Gases," outlines the contents of six other bulletins now available from the company. The catalogs cover specific usages of Phillips 66 butane-propane for efficient utility operation. Copies may be obtained from the Industrial Section, Philgas Division, Bartlesville. Titles of the bulletins are as follows:

No. 173—Replacing Manufactured Gas With Propane-Air or Installation of New Propane-Air Facilities
No. 174—New Undiluted Propane Service to Smaller Towns
No. 175—Increased Gas Sendout Using Present Facilities
No. 176—Enrichment of Manufactured Gas
No. 177—Emergency Standby Facilities for Manufactured or Natural Gas Utilities
No. 178—Underfiring Coke Ovens

SELAS CORP. OF AMERICA, Philadelphia 34, Pa.—The extension of gas combustion to new levels of usefulness in industrial processing, the objective of intensive research that has been applied successfully in production lines by more effective heat transfer to metals under precise control and at high rates of speed, is described in "Speed Heating of Metals by the Gradiation Process." The 78-page booklet is available to production executives upon request.

COMMERCIAL FILMS INC., P.O. Box 7, Cleveland, Ohio—The 1949 Training Film Annual is a 100-page catalog which describes and illustrates 327 currently outstanding ready-made films, as well as projection equipment and accessories. The publisher states that this is the first serious attempt to present the ready-to-use type of sound slide film as an effective, inexpensive visual training tool. Films from $6.50 to $75 and complete sets from $55 up are featured. Titles are grouped according to subject, and an introductory section outlines meeting preparations, showmanship, and the advantages of visual training. The catalog may be obtained for $1, which is credited on the first film or equipment purchase made through the company.

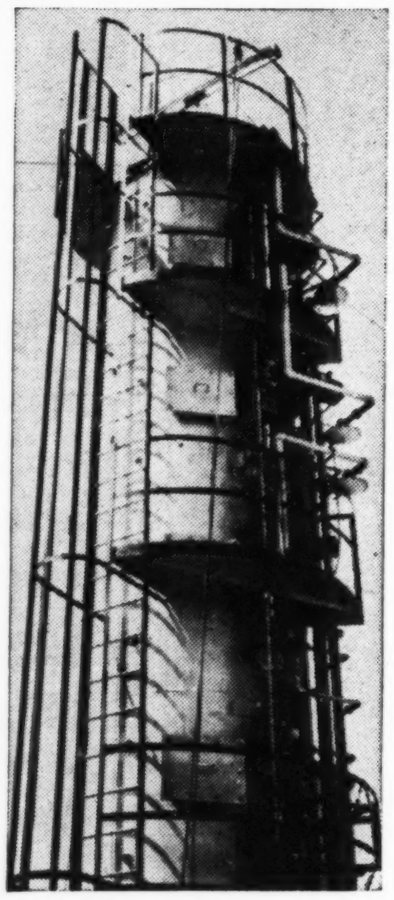
PITTSBURGH EQUITABLE METER DIVISION, Rockwell Manufacturing Co., Pittsburgh, Pa.—Bulletin 1036 is a revised catalog describing this company's line of gas appliance regulators and allied equipment. Divided into three sections, the bulletin includes the following: (1) Aluminum body regulators, ⅛ in. through 1¼ in.; (2) double valve, iron body regulators, 1½ in. through 3 in.; (3) other Rockwell-Emco equipment of interest to those working with gas appliances.

Are You Planning to
REFORM NATURAL GAS ?

The Gas Machinery Company has had many years' experience in designing and installing equipment for reforming natural gas in water gas sets. This type of apparatus is still serviceable and GASMACO is at your service! But perhaps you would like to learn about the new designs and new apparatus which we now have to offer?

GASMACO has the know-how!
GASMACO designs for your profits!

Complete Services — Engineering Shop Fabrication and Field Erection — for hydrocarbon reforming.



Designers Fabricators Erectors Gas Plant Equipment and Industrial Furnaces

THE GAS MACHINERY COMPANY
16108 WATERLOO ROAD
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SALES SLANTS

NEW ORLEANS APPLIANCE SURVEY

How many gas-fired water heaters are there in your bailiwick? How many of them are the storage type; how many are instantaneous? What percentage are owned by the local "400" and how many by the low income brackets? How many own CP ranges; how many have oven heat control?

Should you ask the New Orleans Public Service Inc., purveyors of gas and electricity in the southern city, they can give you a pretty straight answer. A total of 115,500 people on company lines, for example, cook with gas—that's 99.8%. Twelve hundred—that's 1%—have CP ranges; 45% have ranges equipped with oven heat control. Gas customers in the high and high middle income groups all use gas-fired water heaters, etc.

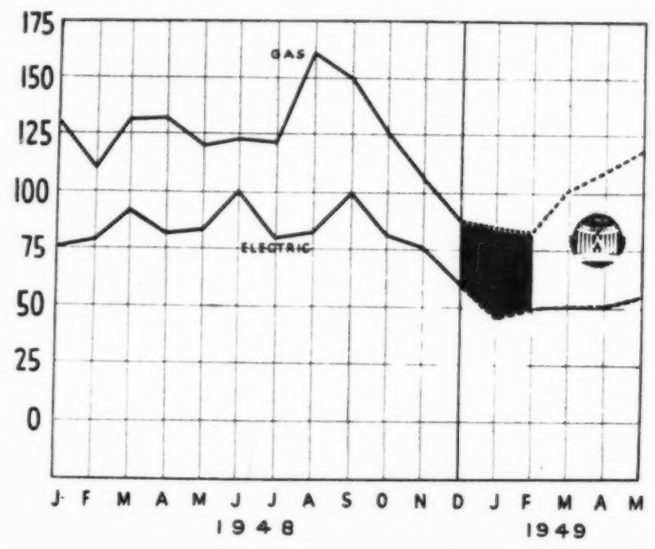
The utility's market data is truly exhaustive. It is the result of a survey made in December of last year, covering 120,000 customers, and clearly indicates the size of the potential appliance market, at the same time "uncovering some of the characteristics of those persons comprising this market." Where possible, added value was built into the survey by comparing 1948 statistics with those compiled in a similar survey made in 1941.

Not content with an ordinary sampling system, the company made a thorough canvass of all users in the city of New Orleans. This was complemented with a 10% cross-section of customers on certain suburban meter reading routes. Each residence was classified as to rental value, type of structure, and general condition. Incomes were estimated for each rental group, with divisions for statistical purposes being made as follows: $12,000 and over, high; $8-12,000, high middle; $5-8000, middle; $3-5000, lower middle; under $3000, low.

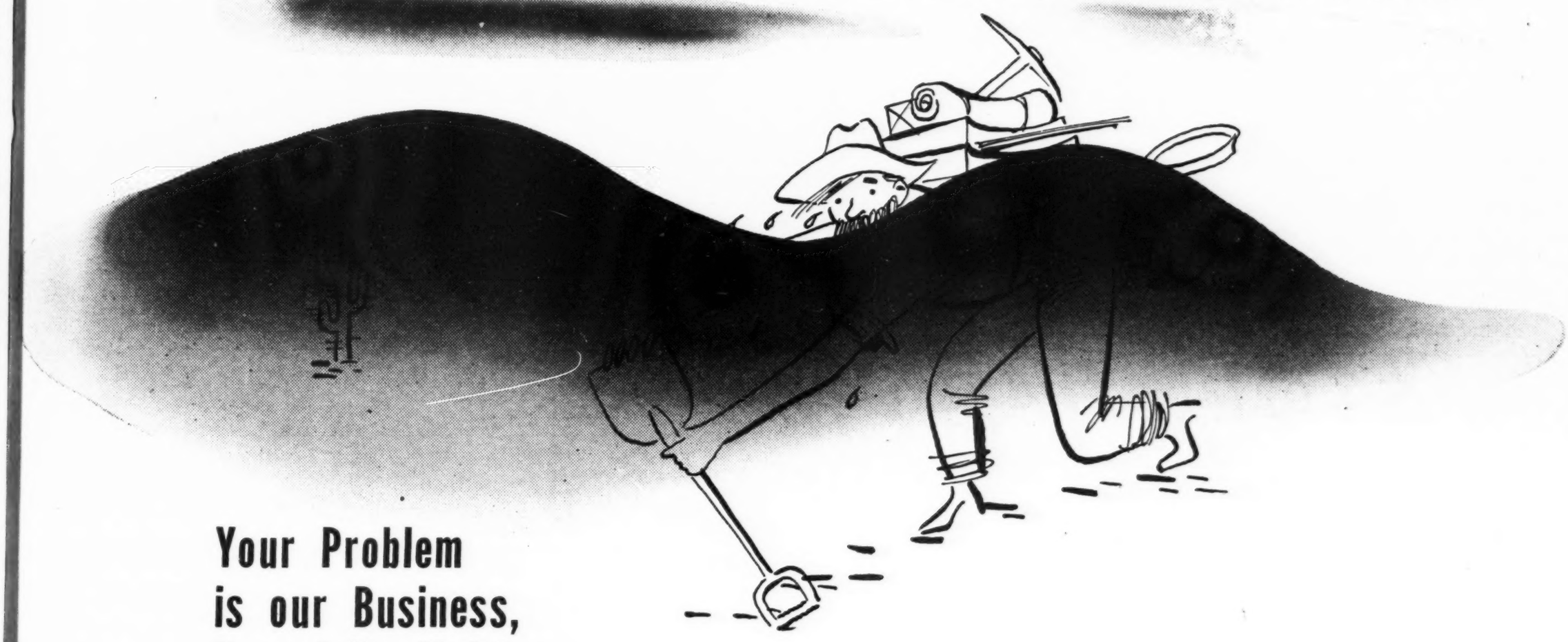
Some of the tabulations which were made up from the survey were a table of customers by income, numerical and percentile; a graph based on census of tenure—home owner versus tenants; percentage of customers living in one-family, two-family, and multiple-family units; and a census of every type of home appliance.

These facts are now hard at work helping to direct the company's sales efforts into profitable channels.

EFFECT OF THE Court of Flame campaign which began last January is shown in this graph. Gas and electric water heater sales (in thousands) almost paralleled each other last year, but when the big GAMA promo-



LET US HELP YOU WITH THAT LOAD, PARDNER!



Your Problem is our Business, Especially if it's—

FUNCTIONAL MACHINED BRASS CASTINGS (Valves, Fittings)

Maybe you have a problem!

Maybe it's the design or the production source of a brass casting—a casting, let's say, that's to be functional and will need to be machined. Yours may be a standard article or possibly may be a special item calling for depth and breadth of knowledge in casting brass. It may be a valve or a fitting that needs the attention that only half a century of experience will satisfy.

There, Pardner, is where we come in! There's where we can really take a load off your shoulders. Rely not only on our long experience and straight-line reputation in working in brass, but place your confidence in our expanded Research and Development department whose business it is to tackle the difficult problems and come up with the right answers for you and for us. Rely, too, on our sales engineering representatives to be at your doorstep in a jiffy to advise on a problem—this without cost or obligation, of course.

Your problem is our business—make it your business to bring your brass casting problems to us. We have succeeded in pleasing many customers over many years, and very likely we may have something to offer you.

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OUR SERVICE TO OTHERS is the best indication of what we can do for you. Some of the industries for which "Detroit Brass" has produced functional machined-brass castings in volume and variety—always on the same top-quality level:

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tion got under way the decline in gas sales leveled off and then began a steady climb. National sales of gas water heaters totaled 121,000 in June, compared to 122,000 last June. May 1949 sales, the last month shown on the graph, were 2% less than the same month in 1948.

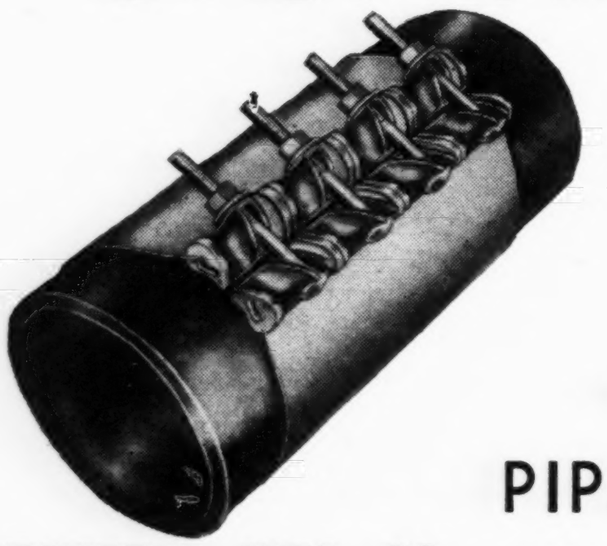
GEORGE D. ROPER CORP., Rockford, Ill., has announced that many price changes have been made throughout the firm's line with substantial reductions on the deluxe double oven 8800 series, the 3800 series, and all models equipped with built-in griddle. Three new models have been announced—two 36-in. ranges and a 40-in. These models will be pushed during the company's current advertising and promotional program.

Gas Code Reprints

So many requests have been received for copies of the "1949 Standard Gas Code," which appeared on pp. 56-63 of the July Safety Issue of GAS, that the code has been reprinted in an 8-page folder. A limited number of copies is still available at 25 cents each.

To our knowledge, the first municipality to adopt the code—as it stands—is the city of Willcox, Ariz., which is due to receive natural gas for the first time through a connection with the El Paso Natural Gas Co. line running from the Permian Basin fields in west Texas and New Mexico to California.

STOP THAT LEAK!



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ASSOCIATIONS

PCGA CELEBRATES AT 65TH CONVENTION

(Continued from Page 33)

Todd, Pacific Lighting Corp., Los Angeles, is slated for technical section leadership.

In the manufacturers section, the following divisional heads will be named: accessories division, J. F. Ray, General Controls, chairman; J. E. Barrett, Thermac, vice chairman; heating division, R. O. Montcrief, Ward Heater, chairman, and T. R. Bridges of Williams Radiator and R. R. Taylor, Fraser & Johnston, vice chairman; range division, Jim Graham, James Graham Manufacturing, chairman, and W. J. O'Keefe, O'Keefe & Merritt, vice chairman; water heater division, W. R. Smith, Continental Water Heater, chairman, and Howard Ferris, Day & Night, vice chairman.

Frank Wills

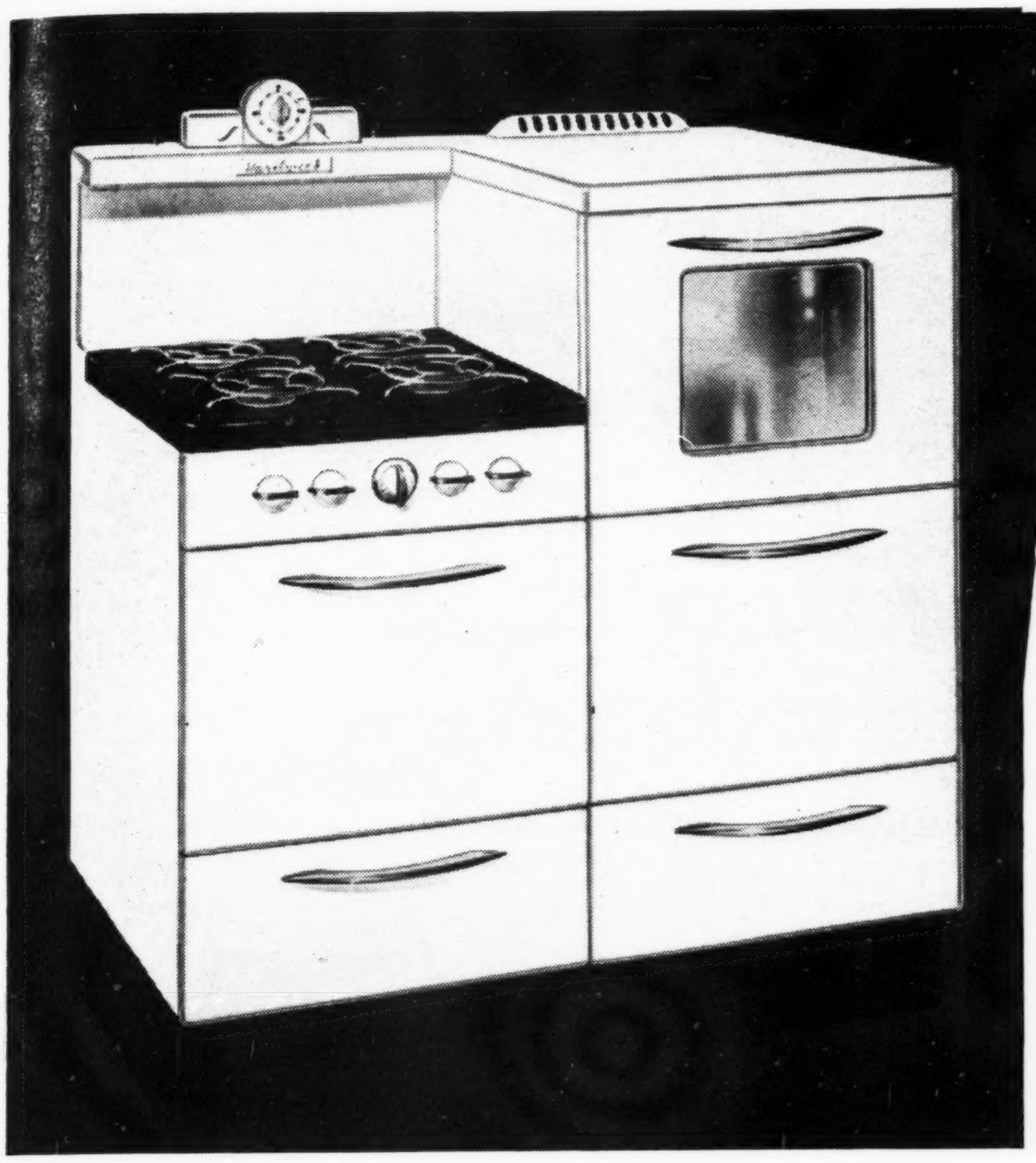
The association has chosen to pay tribute to Frank Wills, who recently retired from the Pacific Gas & Electric Co., with an honorary membership, which will be made official at the meeting. Mr. Wills, who headed the technical section in 1926, won the gold medal and the medal of honor in 1932 in recognition of his extensive contributions to the industry and to the association. A widely known gas engineer, he has authored many outstanding papers and articles during his career.

NACE SCHEDULES TOUR, SHORT COURSE, REGIONAL MEET

This year's short course in corrosion, sponsored by the National Assn. of Corrosion Engineers, is scheduled for Sept. 12-16 at the University of Texas (for details see August *GAS*, p. 57). Several NACE groups have announced other events for the near future.

On Oct. 3-4 the South Central Region will hold its annual meeting at the Adolphus hotel in Dallas. Eight technical papers on various corrosion problems are scheduled, and a panel discussion devoted to problems in pipelines, refining, chemical, water works, production, transportation, and other industries will have L. F. Scherer, Texas Pipe Line Co., Houston, as moderator.

O. C. Mudd, Shell Pipe Line Corp., Houston, and F. L. LaQue, The International Nickel Co. Inc., New York, will be featured speakers at the Annual Permian Basin Corrosion Tour to be held Sept. 27-30 in Midland, Texas. The tour, sponsored by the West Texas chapter of the NACE, will include an exhibit in which 150 manufacturers and applicators of prohibitive and inhibitive products will participate. A fee of $15 will be charged to help defray expenses. Registration may be made through the West Texas chapter, NACE, Box 789, Midland, Texas.



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Hardwick Challenger, the only range with Upper Level Cooking—no bending, no lifting, no peeking. Many women demand this range, will have no other.

NO MATTER HOW MUCH YOU PAY, YOU CAN'T BUY BETTER COOKING PERFORMANCE

PRICED TO SUIT 8 OUT OF 10

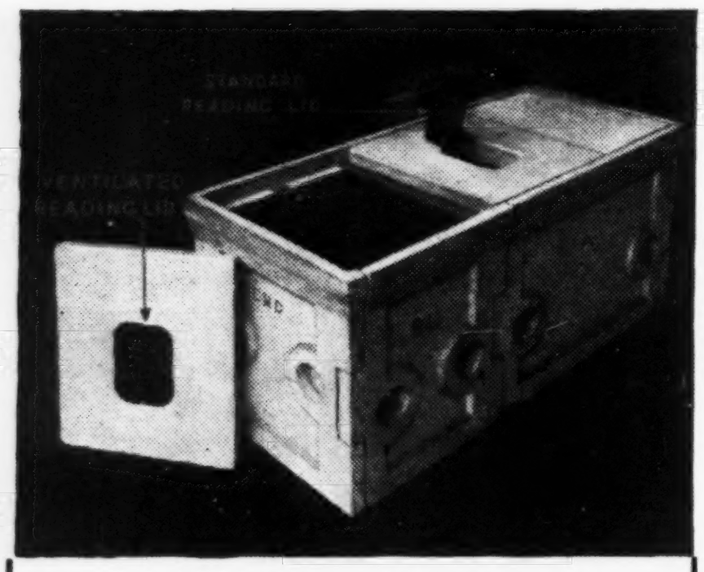
Hardwick Hi-Broiler offers your customers double oven convenience at a thrifty price—gives you extra sales and extra profits.

Selling is made easier with Hardwick Gas Ranges. And you get extra dollars from the ample mark-up provided in the entire Hardwick line.

There is a Hardwick model for every need and a real value in every price bracket. These values are dramatized by well turned promotional numbers that keep Hardwick always ahead. Feature Hardwick for a profitable operation in today's market.

HARDWICK STOVE COMPANY

CLEVELAND, TENNESSEE



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Art Concrete Works has faithfully served the gas industry with thousands of meter and valve boxes of different types and styles adopted as standard by many of the largest gas companies.

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Reinforced concrete plates are paneled to reduce weight and help anchor box at grade. Self-closing reading lids are cast-iron.

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With the demand for gas at an all time high, Iron Sponge answers the need for rapid flow and higher pressures in gas purification. Specify Iron Sponge for extra high capacity and activity . . . longer periods between necessary recoverings . . . fast, complete come-back after fouling . . . low initial cost and low maintenance . . . minimum operator attention. These are the advantages that have made Iron Sponge the choice of the gas industry for over 73 years.

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PROGRAM ADDED TO SCMA INSTRUMENT SHOW

The 2nd Annual Measurement & Control Instrument Exposition will be held in the Municipal Auditorium in Long Beach, Oct. 4-6. Sponsored by the Southern California Meter Assn., this year's meeting promises to be the largest ever held by the organization. Anticipating a larger crowd and a demand for more display facilities, officials in charge have made arrangements for additional space at the auditorium.

General chairman of the exposition committee is J. F. Gesner, sales engineer for the Reliance Regulator Division, American Meter Co. G. W. Stevenson of American Meter is chairman of the publicity committee.

Robert F. Fields, president of the Southern California Meter Assn., points out that a program covering important topics on measurement and instrument control equipment and applications will be presented at various times during the three-day meeting. Outstanding authorities from the industry will present papers and lead discussions on measurement and control problems.

Arrangements are also being made for the showing of two sound motion pictures during the show. One will deal with the construction and operation of the Texas-to-California gas pipeline, and is being furnished by Southern California Gas Co., Los Angeles. A second film, to be furnished by Shell Oil Co., deals with various phases of the oil industry.

Calendar

September

Mid-West Gas Assn. School & Conference — Iowa State College, Ames, Sept. 6-8.

Pacific Coast Gas Assn. Annual Convention—Santa Barbara, Calif., Sept. 7-9.

New Jersey Gas Assn. — Monmouth hotel, Spring Lake, N. J., Sept. 9.

The Maryland Utilities Assn. Fall Conference—Cavalier hotel, Virginia Beach, Va., Sept. 9-10.

National Butane-Propane Assn.—Jefferson hotel, St. Louis, Sept. 19-20.

Mid-Continent Oil & Gas Assn. Louisiana-Arkansas Division — Roosevelt hotel, New Orleans, Sept. 22-23.

October

National Assn. of Corrosion Engineers, South Central Region—Adolphus hotel, Dallas, Oct. 3-4.

Southern California Meter Assn. Measurement & Control Instrument Exposition — Municipal auditorium, Long Beach, Oct. 4-6.

Oklahoma Utilities Assn. Gas Division—Biltmore hotel, Oklahoma City, Oct. 7.

American Standards Assn. Annual Meeting — Waldorf Astoria hotel, New York, Oct. 11-14.

Texas Mid-Continent Oil & Gas Assn. Annual Meeting—Rice hotel, Houston, Oct. 13-14.

American Gas Assn. Annual Convention—Chicago, Oct. 17-20.

National Metal Exposition—Cleveland, Ohio, Oct. 17-21.

National Safety Congress—Morrison hotel, Chicago, Oct. 24-28.

National Metal Trades Assn.—Palmer House, Chicago, Oct. 26-28.

Independent Natural Gas Assn. of America Annual Meeting — Baker hotel, Dallas, Oct. 31.

November

American Petroleum Institute—Stevens hotel, Chicago, Nov. 7-9.

National Hotel Exposition—New York, N. Y., Nov. 7-11.

Mid-Southeastern Gas Assn.—Raleigh, N. C., Nov. 10-11.

Wisconsin Utilities Assn. Annual Meeting—Milwaukee, Wis., Nov. 21-23.

American Society of Mechanical Engineers Annual Meeting—New York, N. Y., Nov. 27-Dec. 2.

National Personnel Conference of the Gas Industry—Netherland Plaza hotel, Cincinnati, Ohio, Nov. 28-29.

December

The American Society of Refrigerating Engineers Annual Meeting—Edgewater Beach hotel, Chicago, Dec. 4-7.

January

Southwest Air Conditioning Exposition—State Fair Grounds, Dallas, Texas, Jan. 23-27.

March

New England Gas Assn.—Hotel Statler, Boston, Mass., March 23-24.

Southern Gas Assn.—Galveston, Texas, March 27-29.

April

AGA Distribution Motor Vehicle & Corrosion Conference—Book Cadillac hotel, Detroit, Mich., April 3-5.

AGA Sales Conference of Industrial & Commercial Gas Section—St. Louis, Mo., April 4-6.

Mid-West Gas Assn.—Hotel Lowry, St. Paul, Minn., April 10-12.

Southwestern Gas Measurement Short Course—University of Oklahoma, Norman, Okla., April 11-13.

National Petroleum Assn.—Hotel Cleveland, Cleveland, Ohio, April 12-14.

National Conference of Electric & Gas Utility Accountants—Brown hotel, Louisville, Ky., April 17-19.

TOPOCK TO MILPITAS

Special Engineering Features Of PG&E's "Super Inch"

By FRED F. DOYLE

AS this issue of *GAS* goes to press, the construction of Pacific Gas & Electric Co.'s huge natural gas transmission pipeline extending from a point in California just across the Colorado river from Topock, Ariz., about 15 miles south of Needles, Calif., to Milpitas Terminal, six miles northeast of San Jose, Calif., is well under way.

Exclusive

Actual construction work was started last June 29 by the contractors, Bechtel-Price & Conyes, at a point 80 miles south of Milpitas near a place called Llanada in the Panoche hills of the coast range. Work will proceed northerly on to Milpitas Terminal, the plans being to have it in service for the forthcoming winter load. It will serve as additional storage to some extent for normal operation and will give additional capacity available for abnormal peak day loads to transport gas north from the San Joaquin valley fields to the bay area, including San Jose and towns along "the peninsula" to San Francisco and, on the east side of the bay, up to Oakland.

Beating the Rains

Another advantage of building this section first is to carry on the work before the rainy season sets in, as most of it is over rough terrain and very hilly country.

The line will be 506 miles long and of 34-in. diameter, being the largest ever laid for gas; for this reason, it was named by one of the heads of the company's gas department "The Super Inch." A description of the project was very well covered in the April, 1949, issue of this magazine, but there are a few special features relative to the construction that should be of interest.

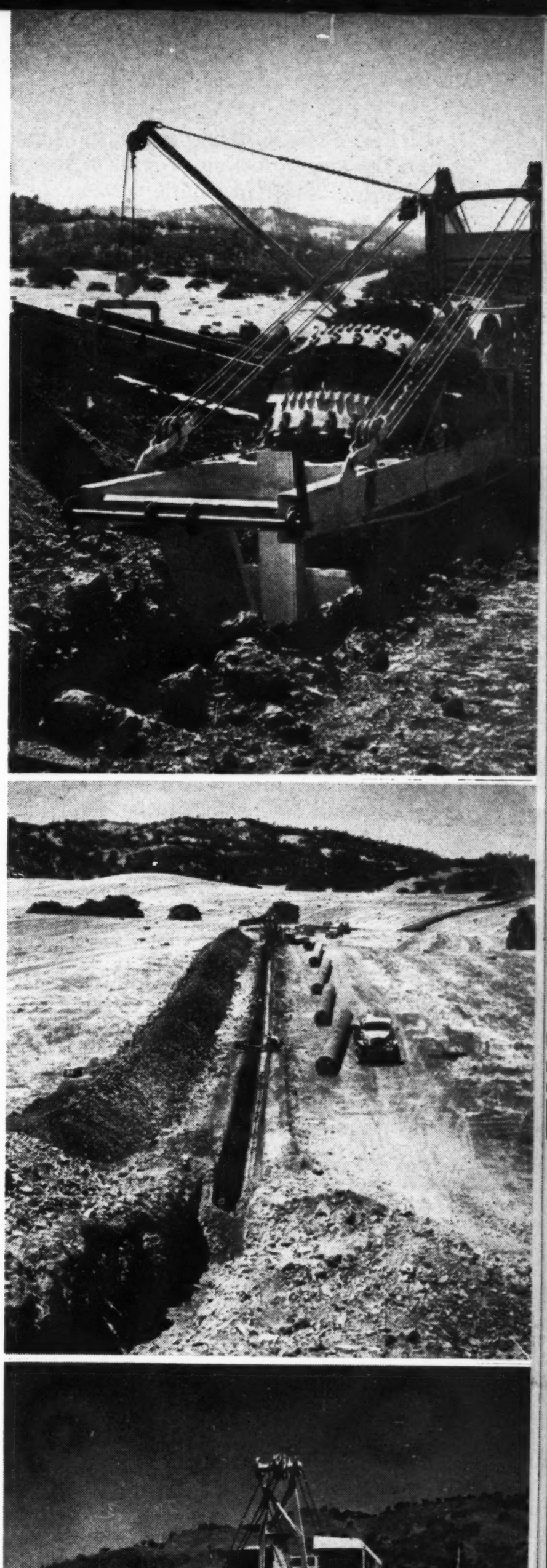
Equipment

Not only is the pipe a "Super-Inch," but "super-equipment" has to be used to do the job. For example, the trenching machine weighs 32½ tons, is 50 ft long and is the largest wheel-type digger built. The trench it is cutting is 44 in. wide, 5½ ft deep, and is digging about one mile a day. When the going gets too tough for the big ditcher, especially in rocky ground, a giant crawler backhoe is used for excavating. Both machines are shown in action in photographs accompanying this article. Also shown is a view of the Panoche hills where construction has started.[1]

Due to the large size of the machinery being used, including trucks for hauling, tractors, etc., working space had to be cleared along the right-of-way in advance; benches 54 ft in width are being cut out of the hillsides, and tops of hills are cut off to reduce or eliminate steep grades which would require sharp angles in the pipeline.

There are a great many canyons and gullies along the right-of-way in the section now being built, averaging one to a mile. Steel and concrete structures

[1]All photographs courtesy the Bechtel Corp.



Super-equipment used on the "Super-Inch" included the giant trenching machine, shown at top, and the huge crawler backhoe (bottom), which is used in rough terrain. Center photo shows Panoche hills, where construction started.

Mr. Doyle is gas supply and transmission engineer for PG&E in San Francisco.

will have to be built across them to support the large pipeline, several of them exceeding 200 ft in length.

Use of Radio

A new feature in pipeline construction in California is the use of short-wave radio for communication in the field. The construction crews' fixed station is a 50-w setup, located in the Bechtel superintendent's office, and mobile stations are in jeeps, all having the same call letters.

As stated in the previous article on this line, there are several different wall thicknesses used; namely, ½-in.; 7/16-in.; ⅜-in.: 1/32-in. and 5/16-in. Portions of pipe of these wall thicknesses are not all in one section for each size, however. This is because it is a so-called "tapered" line.

Ultimately there will be a compressor station at the southern terminus of the line (tentatively called "Topock Station"); 168.5 miles north and west will be a second compressor to be known as "Hinkley Station"; then, 186.5 miles to the northwest will be a third station at Kettleman hills, in reality an addition to the present station. Along the line will be pressure limiting stations, two between Topock and Hinkley, three between Hinkley and Kettleman, and two between Kettleman Station and Milpitas Terminal. The pipe having the heaviest wall will be used at the outlet of the three compressor stations, and the thickness will be reduced at each one of the pressure limiting stations with the exception of No. 7, the last one, where the thickness will be ½-in. for 15 miles where the line goes through a more thickly populated area. At each such station there will be a cluster of valves, automatically pressure-operated to prevent the pressure on the pipeline, on the downstream side of the valve set-up, from exceeding the maximum working pressure for which the pipe in that section was designed.

Sketch Explained

Fig. 1 is a diagramatic sketch of the valve set-up for a pressure limiting station. In the main pipeline is a 30-in. plug valve marked "A"; on either side is a 24-in. side outlet with 24-in. valves marked "B"-"B¹", and in between is a 24-in. valve marked "C", with two 12-in. blowoff valves marked "D"-"D¹".

During normal operation of the pipeline, valves A, B, B¹ and C are fully opened and blow-off valves D and D¹ are closed. With the exception of B and B¹, those valves are equipped with piston-type reversible pneumatic motors activated by gas pressure from the pipeline. The gas-driven motors will respond to the output of conventional-type pressure controllers operating through small control valves. All valves have elevated gearing.

If, for any reason, the pressure on the downstream side of Valve "A" should rise to within about 10 psi of the pressure limit on the pipe on that side, the valve will automatically close, causing all gas to pass through the 24-in. bypass. Then, if the pressure still continues to rise, Valve "C" starts to close slowly and throttles the gas to the point where the pressure limit on the pipe is reached, then closes, and blow-off valve "D" opens to the atmosphere. Likewise, if the pressure then decreases below the limit set, the blow-off valve closes and the valves resume their normal operating positions.

Valve "D¹" shown on the right side of *Fig. 1* normally remains closed unless the pressure on the upstream side exceeds the permissible design pressure.

Main Line Valves

There are main line valves located approximately 10 miles apart along the line, but those in between the pressure limiting valves are installed in the conventional manner, with 12-in. blow-offs on each side. They are hand operated, but are arranged so that they can be operated by an air motor.

In the middle of each of the 10-mile sections, there is also a 12-in. blow-off valve which could be used in case of emergency, thus obviating the necessity of travelling the entire 10 miles to control the bleeding of the section.

All fittings on the line, such as 34-in. x 24-in. tees to be welded to the steel main line valves, are of manganese copper steel, ¾-in. wall thickness, with a minimum yield of 47,000 psi and a minimum tensile strength of 67,000 psi.

A machine for cold-bending the pipe is being used, subject to certain limitations. It can be used where the angular deflection required is such as may be formed by an arc whose minimum radius of curvature is 130 ft or greater, without exceeding the limits of the 15-ft right-of-way strip.

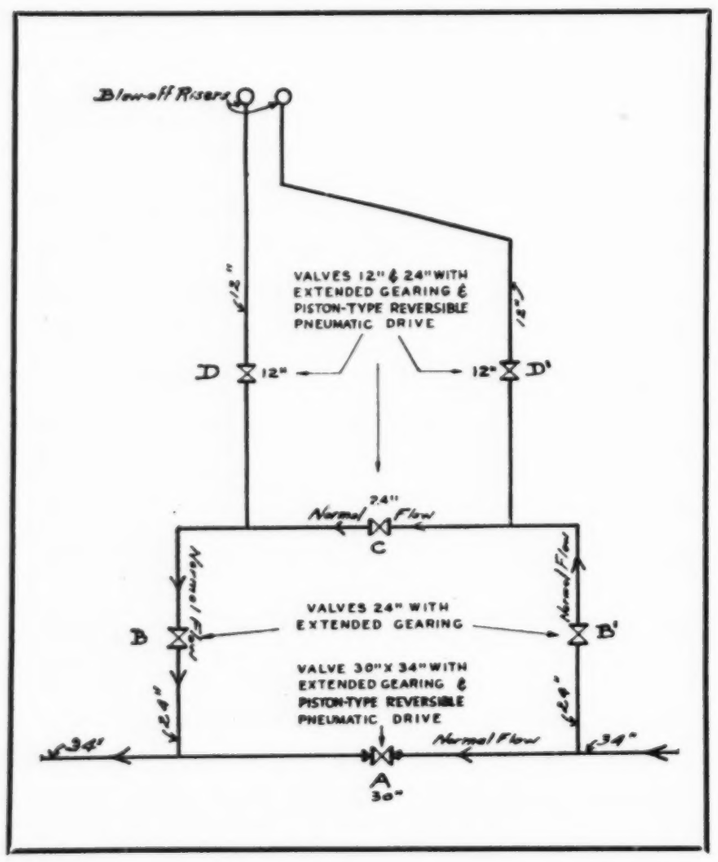


Fig. 1. Diagram of 34-in. pressure limiting station on Topock-Milpitas line.

Wrinkle Specifications

The wrinkle bending machine used has to meet the approval of Pacific Gas & Electric Co.'s construction department. Wrinkles must not be spaced closer than a pipe-diameter apart, and the maximum angular deflection per wrinkle must be 1½ deg. In no event are wrinkles allowed to be formed within 5 ft of the end of a pipe section of 60 ft, and the maximum cold bend allowed is 10 degrees.

Where the cold-wrinkle bending machine cannot be utilized, and where the angular deflection required is greater than can be formed by the wrinkle-bending procedure as specified, the deflection must be made using factory-fabricated bend sections. These bend sections are mitre bends, or segments of welding elbows in angular deflection of 7, 14, 21, and 28 deg.

On existing PG&E pipelines, ordinary blank flanges are used for closing off ends of pipe, whereas on this new line unibolt blanking plugs, which are much lighter (about one-third the weight of flanges) and much easier to open when necessary, will be used.

Communications

A communication system from San Francisco to Topock Station via Milpitas-Kettleman-Tehachapi-Mojave and Hinkley has been planned. The company's existing wire circuits will be utilized from San Francisco to Kettleman, and new circuits will be built or acquired from there to Topock Station. Carrier channels will be provided where needed so that there will be communication between stations or srtaight through from the chief gas dispatcher's office without interference. Also, teletype facilities may be installed to operate all the way through on a carrier, independent of all other circuits. There will be some sort of communication at every station along the line, at all valves and, in addition, radio communication for repair-crews out on the line.

Fifteen miles south of Needles, Calif., there is a Santa Fe Railway main line bridge and, parallel to it, a comparatively new highway bridge connecting the roads in California and Arizona. When the latter was built, an old highway bridge was abandoned but never dismantled. It is ideal for a pipeline crossing, and has been acquired for the joint use of the Pacific Gas & Electric Co. on the California side and the El Paso Natural Gas Co. on the Arizona portion.

FIELD [illegible]IONING of a large diameter pipeline

Methods used and advantages of an "over-the-ditch" type of operation are told by A. B. Polley

Force of sandblasting tool fills atmosphere with dust as workman prepares Pacific Lightings Corp.'s line for job described herein.

BY 1944 the reconditioning of a portion of Pacific Lighting Corp.'s 26-in. Kettleman Hills-Long Beach (Calif.) pipeline was necessary to guarantee uninterrupted future service of the line. This line was originally installed in 1931. From the information available in 1944, a planned reconditioning program for a portion of this pipeline was undertaken. The program, as then set up, called for the reconditioning of the 56 miles of line from Kettleman Hills south, to be performed within a period of five years, an average of 10.2 miles per year. A study of the summer gas load and paralleling facilities indicated that a maximum of 10 miles of line at one time could be removed from service without seriously affecting the overall capacity of combined facilities. These and other factors were conducive to the selection of an "over-the-ditch" type of reconditioning.

In 1944 and in each subsequent summer a section of the line has been removed from service, raised, reconditioned, coated and reinstalled. The tabulation of the amount of reconditioning by years follows:

1944	9.2 miles
1945	19.9 "
1946	15.0 "
1947	3.9 "
1948	9.2 "

The reconditioning has not been performed in any locational order. The sections have been selected by their condition. A complete record of test hole information is kept and leaks are graphed by number and location. The worst remaining section or sections as indicated by this operational information has been worked over each year. The length of the sections has varied from 3.9 to 15.0 miles. Never has it been necessary to break up one summer's work into more than two sections.

Deviation

Until 1947 no deviation in the original program had been made. But in that year it was found that a section of line south of Mile 56 was in greater need of reconditioning than the remaining sections to the north. Such was again the case in 1948. The reconditioning as planned for 1949 will finish the last of the poor sections south of Mile 56 and next year should see the completion of the reconditioning of a continuous 76-mile section.

The topography of the sections of the pipeline reconditioned to date has varied from the flats in California's San Joaquin Valley to the rolling terrain of Kettleman Hills, Elk Hills and Buena Vista Hills.

The amount of preparatory right of way work necessary for the reconditioning of the pipeline has consequently varied from little or none on the flats to considerable in the rolling country. In general, sufficient grading has been performed in all locations to provide a cleared area accessible to the construction equipment, 25 ft wide along one side of the pipeline route. In this particular work and in general company practice our specifications provide that we assume the responsibility for all crop damage within a strip 20 ft wide. All other damage and all crop damage outside the limits of the 20-ft strip is the responsibility of the contractor. This practice has proven satisfactory not only to the company but to the contractor.

The grading operation has been closely followed by a ditcher stripping the cover from the pipeline to within 6 in. of the pipe. Daily average progress of the stripping operation has been approximately 2200 ft. To maintain the overall job progress it has been generally necessary to double shift this operation for seven days a week. Bell holes have been excavated at all cross line locations spotted prior to or during the stripping operation. The line has then been cut at these locations prior to raising.

The raising has usually been done with three sideboom caterpillars. The first sideboom has been equipped with a cable sling and used to break the pipe free from the ground. The following two sidebooms, equipped with dolly cradles, raise the pipe clear of the ditch and place it on skids along side the ditch on the opposite side to the spoil bank. Progress of the raising has conformed to the stripping and other job operations. With the pipe raised and on skids clear of the ditch, the ditch left by the stripping has been backfilled. It has been found more economical to re-excavate the ditch than to hand-crumb the loose dirt.

Following the raising and prior to the sandblasting the pipe has been cleaned with a conventional traveling gasoline-powered type pipe cleaner equipped with knives instead of the usual gear cutters. The substitution of knives was made necessary because the old coating filled the teeth of the gear cutters and resulted in the loss of efficiency. A further increase in the efficiency of the cleaning operation has been obtained by confining the operation to the cool early morning hours before the heat had an opportunity to

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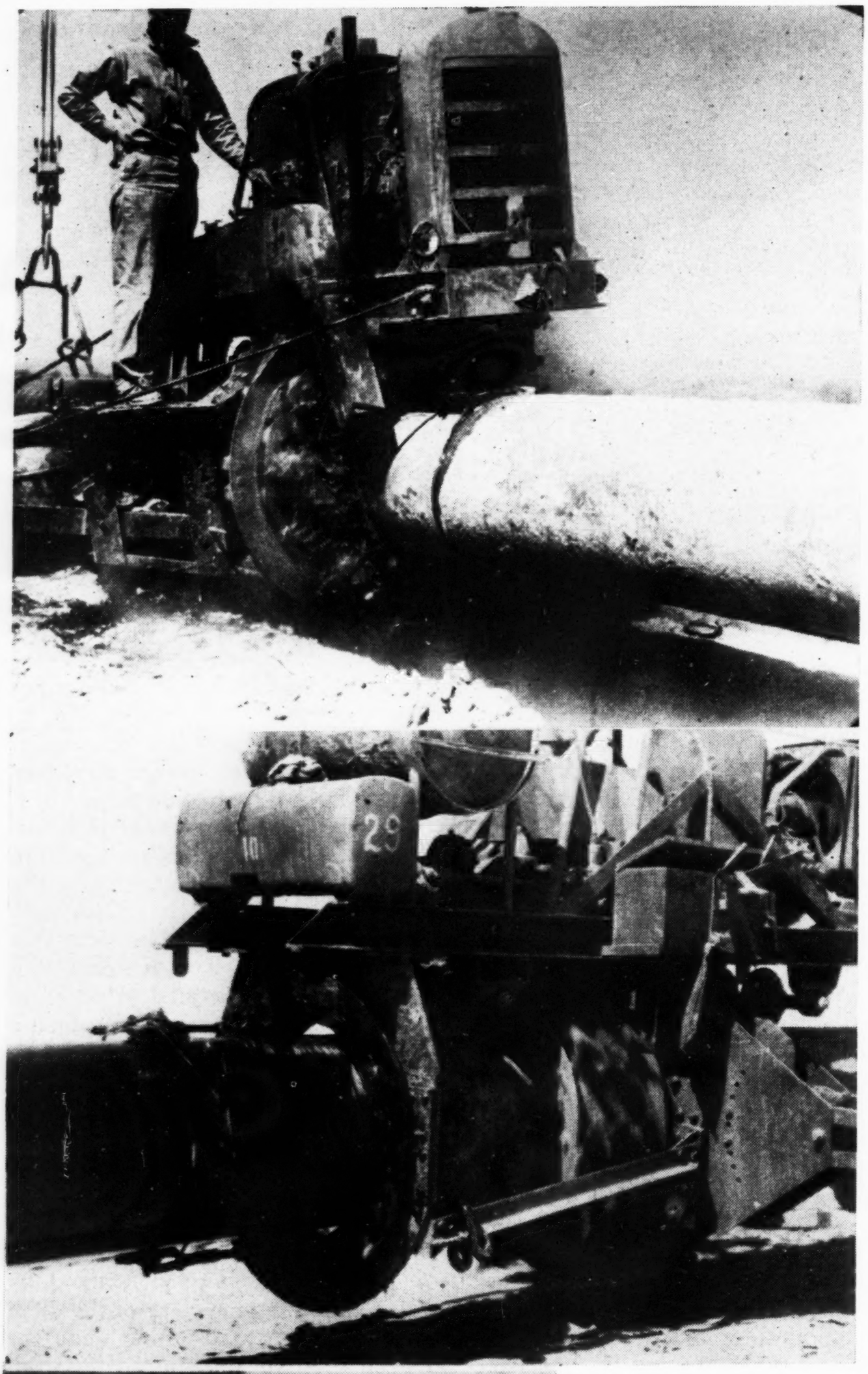
Presented by the author, engineer with Pacific Lighting Corp., Los Angeles, before the Pacific Coast Gas Assn. transmission conference, San Francisco, May 19.



TOP: Traveling cleaning machines removes old coating from line. Special cutting knives replaced gear cutters.

CENTER: Cleaning machine equipped with priming head for use in the priming operation.

BOTTOM: Closeup of cutting knives. Efficiency was increased by their use, as they resisted clogging, which occurred with conventional gears.

soften the old coating. A single D-7 or D-8 sideboom caterpillar equipped with a dolly cradle has been utilized to lift the pipe, giving the clearance necessary for the operation of the cleaning machine. Average progress per shift on the cleaning operation has been approximately 4000 ft.

After the cleaning and prior to the sandblasting the pipeline has been cut into 300- to 400-ft sections to permit rotation of the pipe to facilitate the sandblasting and spot welding operations.

Sandblasting

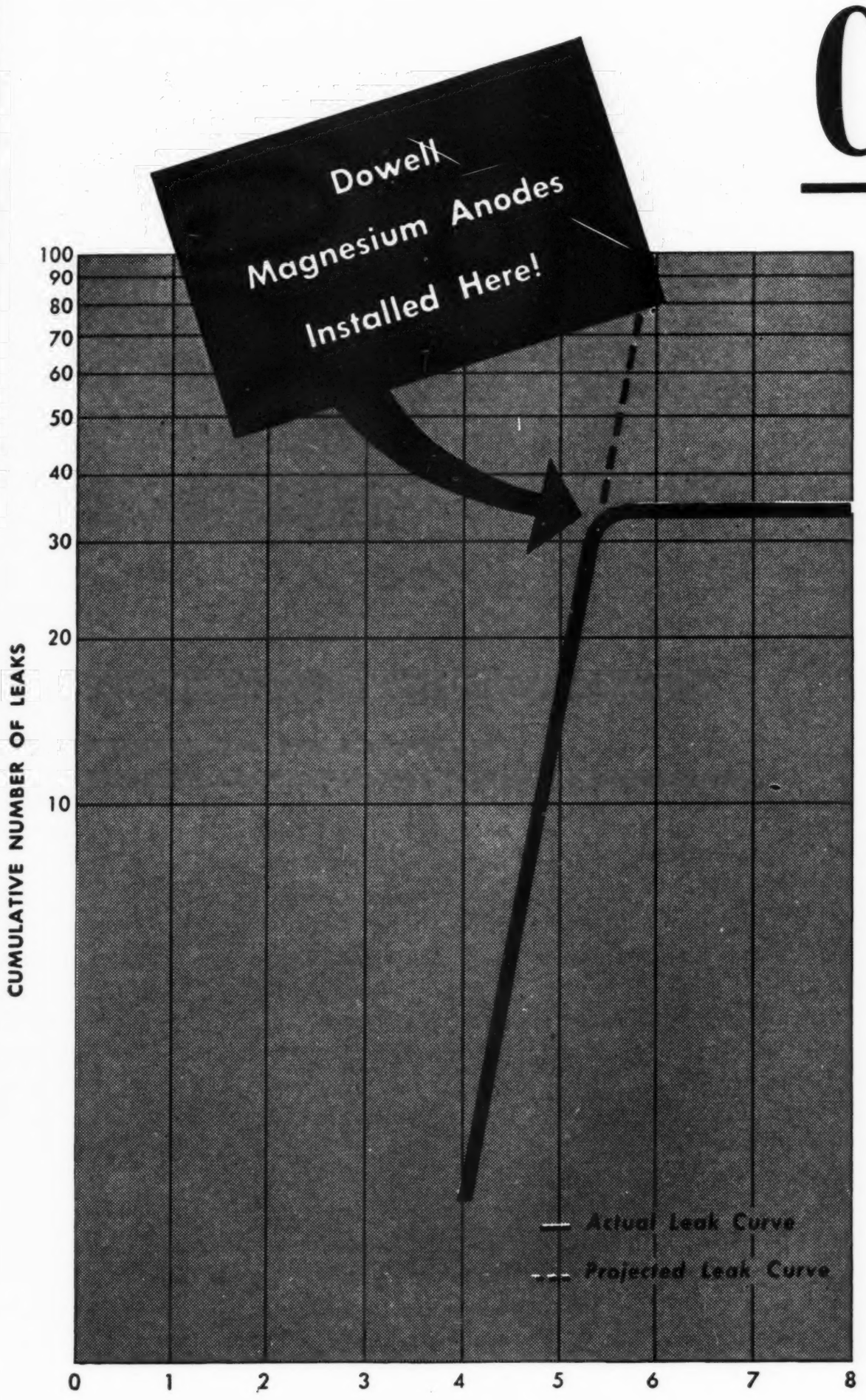
Sandblasting has been used to remove the remaining old coating, surface rust, and scale left on the pipe after the cleaning operation. Truck-mounted 350 cfm air compressors have been used to supply air for the sandblasting units. One 7/16-in. nozzle has been run on each sandblast unit. Average progress per 10-hour shift per sandblast unit has varied between 700 ft and 1000 ft of pipe. The number of units has been varied to meet the overall daily job progress. The procedure has been to sandblast the upper half of the pipe supported on skids and then roll the pipe and sandblast the remaining half. Sandblasting has been found efficient in cleaning the pitted areas on the pipe surface to prepare them for spot welding. After the sandblasting, the surface of the pipe has been inspected, and the areas to be spot welded or those too poor to spot weld have been marked. General practice has been to spot weld pits 4 in. in area or less having a metal loss greater than 10% with two welding passes over the affected area. Pipe containing pitted areas larger than 4 in. and having a metal loss of 25% or more have been replaced. The size of the welding crews has varied with the condition of the pipe and with the overall job progress. Some cracking of the spot welds was encountered and has been corrected by thoroughly peening the weld after the first pass. The percentage of pipe replacement has varied from section to section. Average pipe replacement to date has been 7.6%. The highest pipe replacement on any one section to date was 19% and the lowest 4.81%.

Following spot welding and replacement of poor sections of pipe, the 300-ft to 400-ft sections have been welded into strings ¾ to 1½ miles in length, bull-plugged and subjected to an air test of 100 psi. While under air pressure the circumferential welds and all spot welds have been tested for leaks by painting with primer.

With the completion of the air test, the pipe has been mechanically cleaned and given a coat of coal tar primer. The cleaning and priming have been

Here's How . . .

PIPELINE MAINTENANCE COSTS CAN BE CUT!



One way to lower pipeline maintenance costs is to reduce the number of leaks. The graph at left shows how a Gulf Coast city cut leaks in a 27 block, 2″ galvanized piping system. The system was installed in 1940 and 1941. By April, 1946, leaks were appearing at an accelerated rate. *Then, magnesium anodes were installed!* Result: 2 leaks in the 30 days following installation and *no new leaks for the balance of 1946, 1947 and 1948!*

Cost-cutting protection such as this is being achieved with Dowell magnesium anodes. When corrosion of buried metal structures is a problem . . . for example, on oil and gas pipelines or municipal distribution systems . . . Dowell anodes may afford practical, economical corrosion control. The degree of protection will depend on soil conditions and the number of anodes used. Dowell magnesium anodes require no external power and maintenance is at a minimum.

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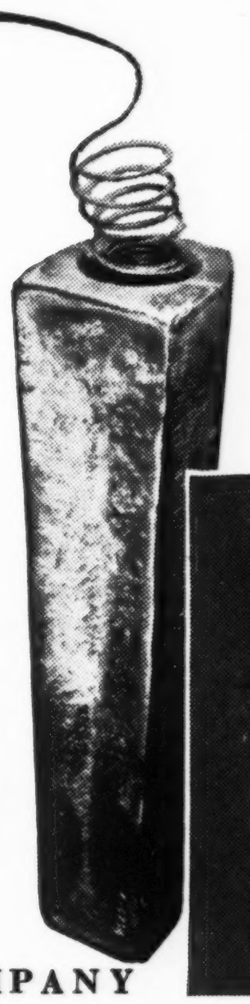

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accomplished in one operation by replacing the knives of the cleaning machine with steel brushes and installing a priming head on the back of the machine. One D-7 or D-8 sideboom caterpillar has been used to lift the pipe for this operation. Because of the limited bonding life of the primer (48 to 72 hours) the progress of the priming operation has been kept within two days of the coating operation. Application of the primer by spray has been attempted but results were not satisfactory. Application by this method indicated the likelihood of a primer coat too thin to provide sufficient bond between the pipe and the remainder of the coating.

Until 1946 the remainder of the protective coating consisted of 3/32-in. minimum coat of coal tar enamel, a 15-lb asbestos wrap, a 2/32-in. minimum coat of coal tar enamel and a wrap of 60-lb or 75-lb Kraft paper. In 1946 it became impossible to obtain the 15-lb coal tar saturated asbestos felt. In the search for a substitute for the felt it was found that there recently had been developed a glass pipeline wrapper. After satisfactory tests, the glass wrapper was substituted for the felt wrapper in that and subsequent years. The use of the glass wrapper altered the order of the application of the coating from that listed above to a 3/32-in. minimum coat of coal tar enamel, 2/32-in. minimum coat of coal tar enamel, a glass wrapper and a wrap of 60-lb or 75-lb Kraft paper. This change in order of application in the coating was made because the glass wrapper with its porosity had sufficient strength necessary to pull the glass into the molten enamel, firmly imbedding the glass. In general practice we have endeavored to imbed the glass to a depth of one third of the total enamel thickness.

Substitute Enamel

With the exception of one 3-mile section, a coal tar enamel having a softening point of 200°F has been used. In the 3-mile section air temperatures below 40°F made it necessary to substitute an enamel having a 178°F softening point to prevent the hair line cracking which resulted from contraction of the pipe. In all sections, the entire coating with the exception of the primer has been applied by a self-propelled coating machine which travels on the pipe and makes the application of all components of the coating within a distance of 6 ft.

Coating machines have been leased by the contractor from two different manufacturers. Improvement of the coating equipment has been continual. The weight of the equipment has been cut by one-third since 1944. Better pumps and power unit have increased the dependability of the unit. Extension of the lip under the last pressure shoe has cut the enamel loss from 5 to 3%. The most recent improvement has been the replacement of steel propelling gears with rubber coated dollies which do not damage the primer coat and give much better traction, making the use of a machine on steeper slopes possible. Enamel for the machine has been heated in conventional 10-barrel tar pots and piped to the coating machine through metallic hose.

An electrical holiday detector has been employed in the inspection of all coating. It has been found advisable to operate the holiday detector as closely to the treating machine as the enamel temperature will permit. By such close operation faulty application can be quickly determined and corrected before a great length of pipe is coated. As the pipe leaves the coating machine, it has been supported on bare skids placed at alternate bell welds. These bells have an O.D. ½ in. greater than the pipe and it has been impossible to obtain a full 5/32-in. enamel coating on these bells, making it necessary to apply another flood coat by hand over the bells. By placing the skids at the bells no additional patching has been required. On plain-end pipe, padded skids having sufficient bearing area would practically eliminate all hand patching. All hand-patching of holidays, skid marks, bells, or other coating which fails to meet specifications has been done just prior to the lowering in. Average coating progress per 5-hour shift has been 3700 ft.

Ditching for reinstallation has been performed by ladder-type ditching machines with weekly progress matching that of the coating operations. The lowering in has been performed by three D-7 or D-8 sideboom caterpillars equipped with slings. To minimize damage to the coating, lowering in and shading operations have been confined to the cool early morning hours prior to 9:30 a. m. An average of three slack loops per mile has been left to guarantee that the pipe in its final position would be in compression. We have attempted to lower all pipe treated the previous day with the exception of the last 600 ft. As soon as the pipe has been lowered in, it has been shaded and then backfilled. One D-7 or D-8 bulldozer has performed this operation. No rock has been present in any of the sections and it has been possible to shade all the line mechanically. Progress on lowering-in and backfilling has been kept up with that of the treating operation. Following backfilling, the line has been blown with gas to remove all loose scale, rust and dust. The line has then been subjected to a hydrostatic test prior to its return to service.

While the foregoing information as to method and manner may be of interest to construction and operation men, management is necessarily interested in the costs involved in the performance of work. In an effort to answer this question, we have prevailed upon one of the contractors to release some of his actual cost figures for a recent 26-in. reconditioning job.

The costs as shown in *Table 1* are bare costs and do not include applicable contractor's overhead and profit nor do they include applicable company overheads.

It is our opinion that with the reconditioning work performed, as outlined in the table, we have placed those sections of pipeline in as near new condition as is possible without complete replacement of the facilities. This type of reconditioning is feasible only where the line location is such that there is sufficient clearance for the operation of the necessary construction equipment. Comparison of costs between plant reconditioning and over-the-ditch reconditioning has consistently indicated that the latter is more economical if there is sufficient clearance, if the condition of the pipeline does not require a high percentage of pipe replacement, and if the existing circumferential welds do not require removal and rewelding.

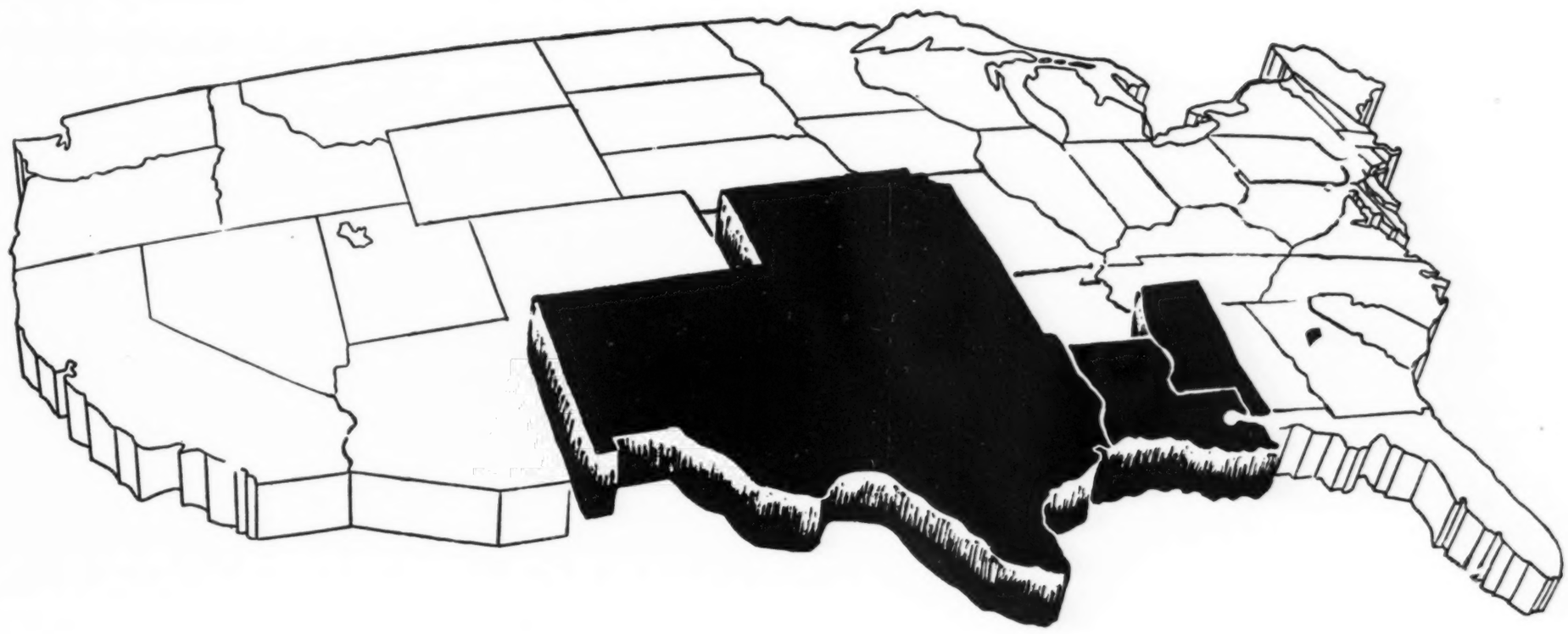
TABLE 1. COSTS PER FOOT

Contractor's Costs	
Excavation and backfilling[1]	$ .28
Raising and lowering in	.13½
Cleaning[2]	.06
Sandblasting	.45
Coating[3] application	.65
Air and Hydrostatic testing[4]	.20
Clean up, on and off, and miscellaneous	.065
Welding[5]	.70
Company Costs	
Inspection[6]	.06
Materials (Metals only)[7]	.19
Materials (Coating)[8]	.51
Miscellaneous[9]	.12
	$3.42

1. Includes excavation for removal, re-installation bell holes, preliminary right of way grading, backfilling, and final right of way and patrol road grading.
2. Includes cost of cleaning prior to sandblasting only.
3. Includes cost of final cleaning, priming and coating application including rental of treating machine.
4. Includes cost of compressing and pumping equipment, water and rental pipe to water supply.
5. Includes all welding costs (spotwelding, rewelding, etc.) except rod.
6. Includes cost of labor for inspection of all operations.
7. Includes cost of all metals used, i.e. replacement pipe, welding rod, chill rings, etc. Percentage of replacement for this particular job was 4.81%. Total welding rod consumption was 13 cents per ft of line reconditioned.
8. Includes cost of primer, enamel, glass wrapper, Kraft paper, and rental of holiday detector. Consumption per foot of pipeline was:

primer	.022 gals.
enamel	11.89 #
glass wrapper	7.45 sq. ft.
Kraft paper	7.25 sq. ft.

9. Includes freight, auto mileage, subsistence for inspectors and other miscellaneous cost.



LOUISIANA: *nation's greatest reserve of natural gas?*

SOUTHERN and coastal Louisiana has moved into number one position, ahead of Kansas' great Hugoton area and Texas' Panhandle and Carthage fields, as the nation's greatest reserve of natural gas . . . both from the standpoint of proved drilled reserves and gas available for sale to new customers.

The reserve of gas, on land and offshore, producible under present operating practices is estimated at between 20 trillion and 40 trillion standard cu ft, depending upon whether 320 or 640 acres is considered the effective drainage area for a single average gas-type well.

As of July 1, 1949, there were 656 gas-type wells in 249 pools. More than half of the wells are closed to production awaiting a market, and in 51 fields there were both producing and nonproducing wells causing disproportionate, unequal withdrawals of gas, with the resulting inequities and inequalities.

At the present rate of production, 500 million cu ft of gas daily, there is a supply in sight for 40 to 80 years.

May Be Doubled

With proper development off-shore and in the tidelands, the present reserve estimate can be doubled, available gas tripled, and production without waste increased to 2 billion standard cu ft of gas daily. There is presently a "community gathering system" contemplated for the drilled, and proven but undrilled, gas off-shore.

The average gas-type well has a producing depth of about 9000 ft below sea level, normal depth pressure and

By ALEXANDER M. CROWELL

In July, a $300-million line, outward bound from Louisiana but with destination unknown, was reportedly on the drawing boards. As reported last month in GAS (p. 92), the line, backed by British money, was to tap a reserve surveyed by Alec Crowell, consulting engineer.

This article is a brief epitome of Mr. Crowell's study, in the author's own words.

The black portion of the map shows the great producing region of the United States, including Texas, familiarly known as "the area of greatest natural gas reserve." Outlined in white is Louisiana, which Mr. Crowell believes deserves that title.

What's news on the pipeline? It's blocked now for want of money, says Mr. Crowell. But another pipeline may soon take up the options.

temperature, separation of gas from water and condensate above 750 psig, cost from $100,000 to $500,000 to drill and complete; and has a reserve of about 22 billion scf of gas, recoverable to 100 psig.

On a 640-acre drainage basis, the average per acre gross reserve is about 34 million scf, on a 15.025 pressure base measurement, as required by the state for reporting purposes.

There are about 64 bbl of condensate or distillate produced with each million cu ft of gas produced. There is no fixed price for gas or condensate, taking the area as a whole.

Eighteen months were spent in the field and office to get the facts in this study. Each well in each pool, on land and off-shore, where records were available, was typed and its history recorded and an estimate of its ability to produce merchantable natural gas made.

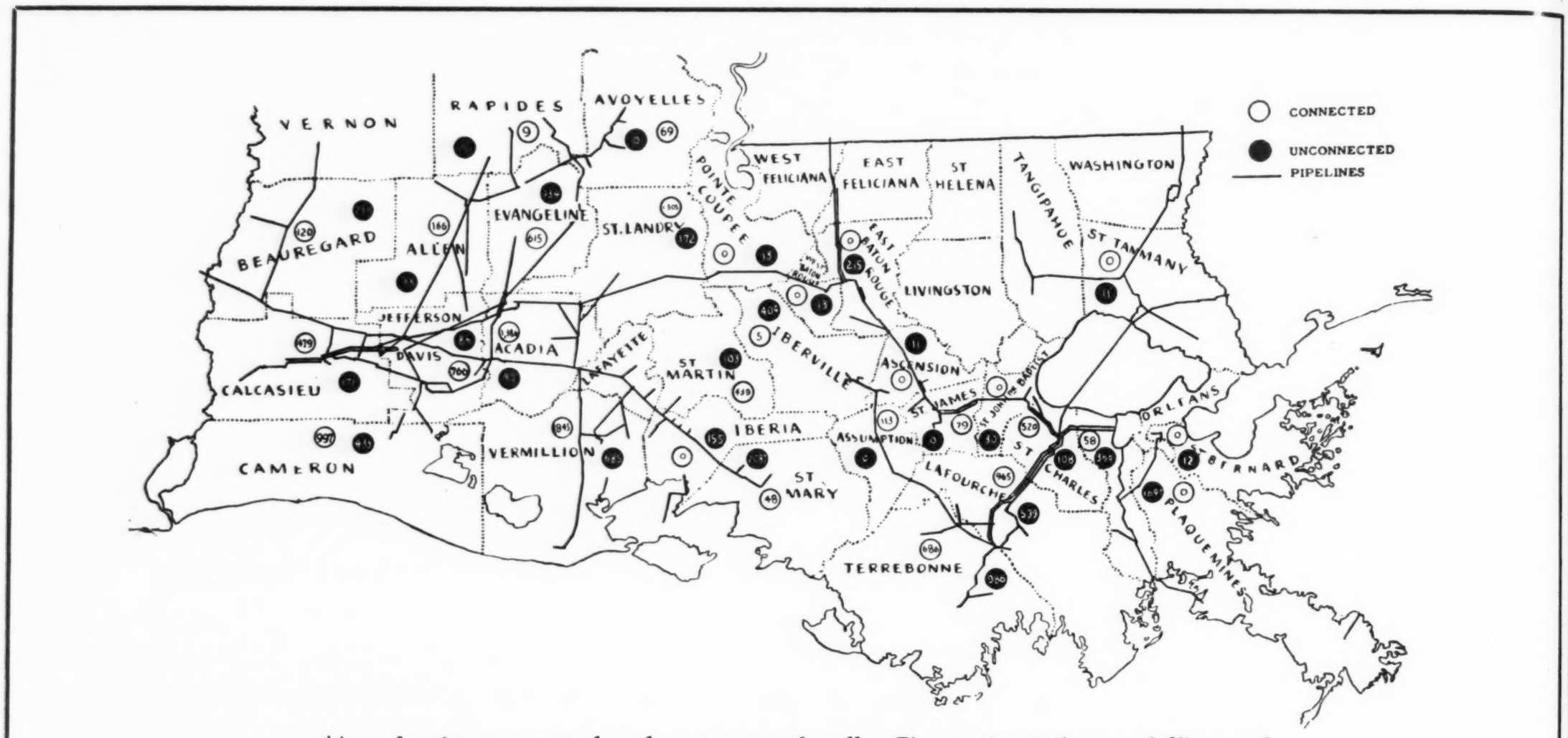
Free gas—not associated with crude oil; cap gas—trapped above an oil deposit; and solution gas—dissolved in oil—were all considered in each reservoir . . . if believed merchantable.

Gathering Data

Painstakingly the engineers and geologists gathered the technical data necessary to compute reserves of oil and gas in each reservoir when the operators were without recent calculations that could be checked. A tremendous amount of energy, time and money went into this study, for the purpose to which it is being put may mean a new interstate pipeline and the highest price for gas.

All of the 65 oil and gas operators controlling the natural gas reserves of southern and coastal Louisiana were canvassed, and they were most cooperative both in the districts and at their respective headquarter offices. Seven of these companies own or control 67% of the 10 to 20 trillion standard cu ft of merchantable gas now either without a market or gas-purchase agreement.

Only two major interstate pipelines are operating in the area today—United Gas Pipe Line Co. and Interstate Natural Gas Co.—but two more are coming in for sure. Transcontinental Gas Pipe Line Corp. has a line under construction from southwest



Map showing connected and unconnected wells. Figures in circles are billions scf.

Texas to New York City and will scoop up a little gas as it passes through Louisiana, and Trunkline Gas Supply Co. has gas under contract and an FPC permit to move gas northward.

Retarding Factors

These three items are most often mentioned as retarding development in the area: Seven years of isolation, or the period of a non-export policy by the state; relatively higher taxes; and the lack of more than two major markets. These are either changed or have worked to the advantage of all.

The present administration has reversed the export policy, the .3 cent per Mcf severance and 1 cent per Mcf gathering taxes and the 1% of gross receipts of natural gas companies excise tax have had no deleterious effect, and new pipelines paying higher prices are coming in.

There is more bidding for gas going on in southern and coastal Louisiana today than in any like area in the United States. There is the opportunity to get a price more in keeping with what the producer thinks the gas is worth than ever before—anywhere. That makes trading tough, but the landowner, operator, and the state will ultimately gain.

Insistence on the part of the producer for a "favored nation's clause" (a guarantee to pay him as much or more than his neighbor), measurement on the same pressure base as that at which gas is sold, correction for deviation for variation in volume due to high delivery pressure, and a guaranteed escalation of 1 cent per Mcf every five years of the primary term of the contract may result in a posted price for gas yet.

Oh yes, for those of you who want to buy gas from those who have it for sale, bidding starts at a dime per Mcf.

This study indicates that in Louisiana there is an abundant supply of natural gas—the nation's largest—sufficient to meet all foreseeable demand for many decades. There is no necessity or excuse for hoarding gas. There is a clear and current need for an expanded market which would lead to balance between supply and demand and consequently more equitable prices both to producer and ultimate consumer, and for more interstate pipeline competition—more pipelines.

Hugoton Field Up to Date: Development Is Skyrocketing

THE development of the world's largest dry gas field—the Guymon-Hugoton tri-state field—has been amazingly rapid these past few years. A quick comparison with figures published by *GAS* four years ago (Hugoton; The Story of the World's Largest Dry Gas Field, by E. G. Dahlgren, *GAS*, May, 1945, p. 17) shows just how rapid the expansion has been.

Total developed acreage of the field at the end of last year was 1,311,760. In January, 1945, the total was just over one-fourth of that figure: 352,494 acres. Of the three states, Texas acreage has been developed proportionately faster than that in the other two states; while Kansas acreage has been trebled and Oklahoma's has been quadrupled. Texas has pushed its total to more than six times the four-year-old figure (see *Table 1)*.

The total developed acreage is about 34% of the field's estimated total proved acreage of more than 4 million acres. Proportionately, the Oklahoma sector of the field has been developed to the largest extent (see *Table 2)*.

Number of Wells

The proration reports of the three states for last September show a total of 2003 gas wells, with 1112 in Kansas, 659 in Oklahoma, and 232 in Texas. Comparative figures for April, 1945, totaled 730 wells, with 404 in Kansas, 182 in Oklahoma, and 44 in Texas.

The 2003 wells had a September production of 27,330,163 Mcf at 14.65 lb, or, 911,000 Mcf per day. The cumulative pipeline runs total 1,579,098,866

The data given herein for 1948 are from a paper presented before the Interstate Oil Compact Commission by C. H. Keplinger, J. M. Wanemacher, and Ken R. Burns of Tulsa, Okla.

Mcf at 14.65 lb. The field is under active development, with about 50 wells per month being completed.

Deliverability

Total deliverability of the field last September was 5,304,316 Mcf. This compares with the 1945 figure of 1,-629,700 Mcf. The average well deliverability today is 1855 Mcf for Kansas, 3685 Mcf for Oklahoma, and 3530 Mcf for Texas. Average well figures four years ago were Kansas, 1730 Mcf; Oklahoma, 3800 Mcf; Texas, 4270 Mcf.

The field is huge. Its length and width dimensions are about 150 x 35 miles. Total proved acreage is 4,070,-820 as of last September; in 1945 that figure was estimated at 3,850,000 acres, with the three states dividing it as follows: Kansas, 2 million; Oklahoma, 1.1 million; and Texas, 0.75 million (see *Table 2)*.

The gas throughout the field is uniformly sweet with the exception of a small area in Texas, with 18 producing wells. The sour gas sulphur content ranges from 6 to 30 grains per 100 cu ft. The average Btu value is about 1000. Practically all the gas is stripped for LP-Gas or gasoline. Natural gasoline content of the gas is about 0.35 gal per Mcf. An average analysis of Hugoton gas shows:

Methane	74.26%
Nitrogen	14.27
Ethane	5.81
Propane	3.52
Butane	1.48
Pentane Plus	0.65

Reserve Estimates

Original Hugoton gas reserve estimates vary from 22 to 29 trillion cu ft, representing more than 15% of the nation's known gas reserves on a pressure base of 14.65 lb with an abandonment pressure of 25 lb, one estimate says that 29 trillion cu ft is reasonable. This has

TABLE 1. DEVELOPMENT

Developed Acreage

Jan. 1, 1945		Sept. 30, 1948	
Kansas	220,094	Kansas	731,520
Oklahoma	110,000	Oklahoma	430,480
Texas	22,400	Texas	149,760
Totals	352,494		1,311,760

Gas Wells

April 1, 1945		Sept. 30, 1948	
Kansas	404	Kansas	1112
Oklahoma	182	Oklahoma	659
Texas	44	Texas	232
Totals	630		2003

TABLE 3. PIPELINE PURCHASERS

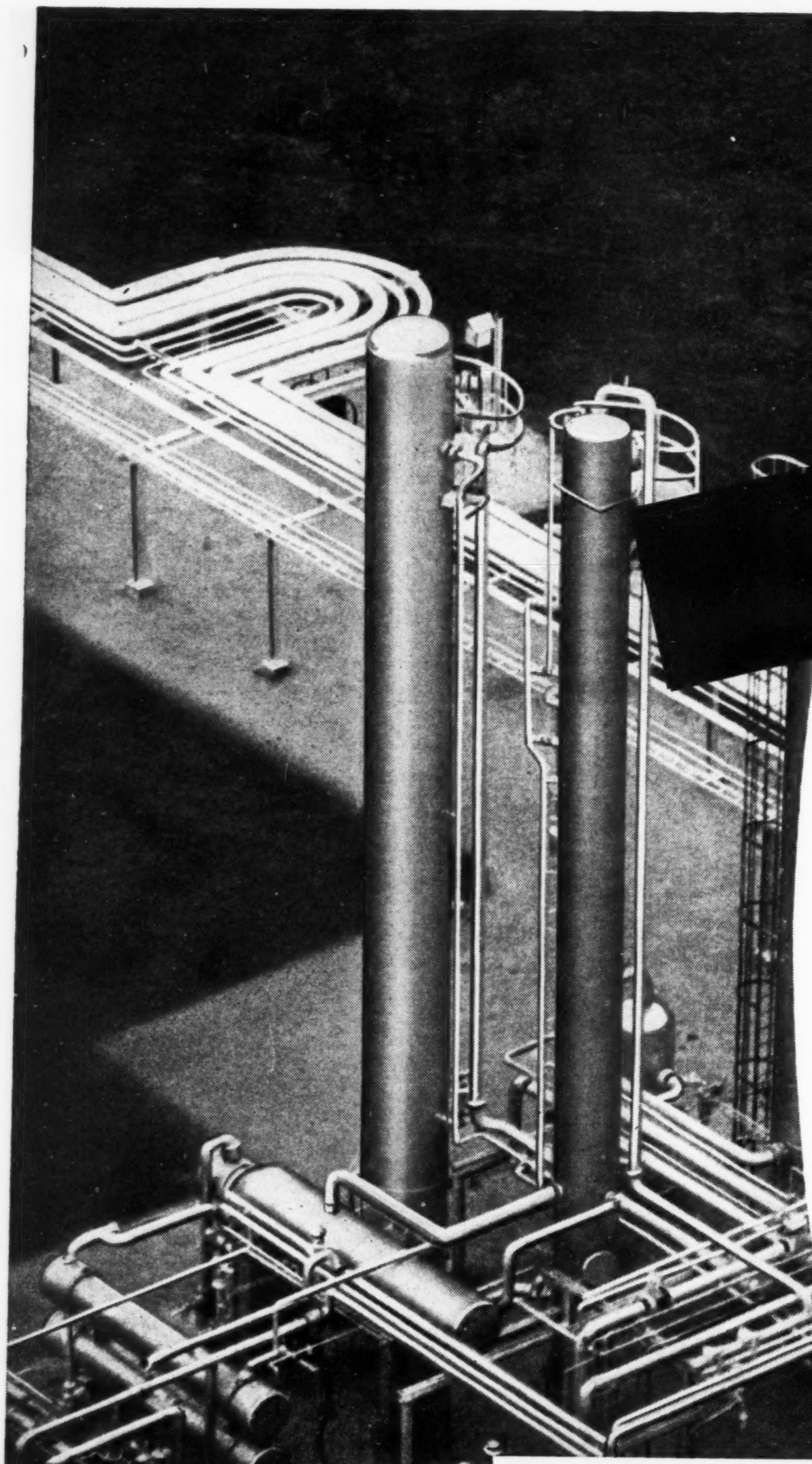
Pipeline Runs September, 1948

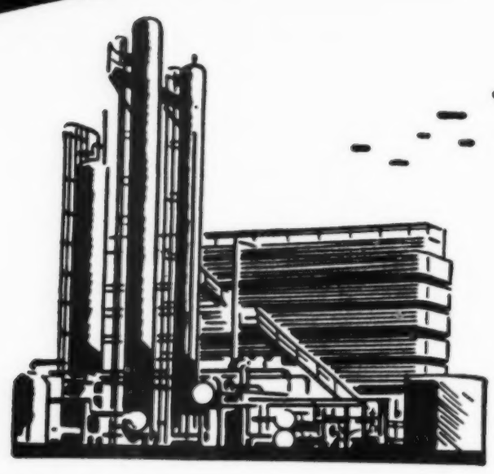
State	*Pipeline Company*	*Well Connections*	*Volume of Runs at 14.65 Mcf*	*Per Cent of Total*
Kansas	Colorado Interstate Gas	149	1,265,089	4.6
	Columbian Carbon & Peerless Carbon Black	59	672,222	2.50
	Farmer Owned	1	24,545	0.09
	Kansas-Colorado Utilities Inc.	7	165.052	0.60
	Kansas-Nebraska Natural Gas	99	1,197,877	4.40
	Liberal Gas	6	19,995	0.07
	Northern Natural	401	4,844,349	17.70
	Panhandle Eastern	260	4,003,347	14.8
	Shallow Water Refining	1	2,400	0.009
	United Carbon	129	1,044,660	3.82
	Total	1,112	13,239,539	48.60
Oklahoma	Cabot Carbon	89	1,065,157	3.9
	Cities Service Gas	394	5,716,395	21.0
	Phillips Petroleum	173	1.910,815	7.0
	Southwestern Public Service	3	87,308	0.3
	Total	659	8,779,625	32.0
Texas	Fuel	49	67,125	0.25
	Phillips Petroleum	138	3,439,573	12.55
	The Shamrock Oil & Gas Corp.	45	1,804,860	6.60
	Total	232	5,310,999	19.4
TOTAL		2,003	27,330,163	100.0

TABLE 2. PROVED AND DEVELOPED ACREAGE

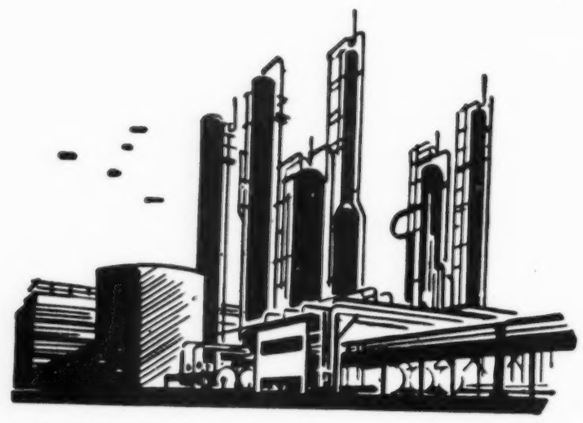
Deliverability and Production by States

State	*Proved Acres*	*Developed Acres*	*%*	*Sept. 1948 Producing Wells*	*Deliverability Mcf* Total	*Deliverability Mcf* Per Well	*Production* In Mcf @ 14.65# Sept. 1948	*Production* In Mcf @ 14.65# Cumulative 10-1-48
Kansas	2,823,300	731,520	29	1,112	2,047,184	1,855	13,239,539	984,436,621
% of Total	62%			55.6%				
Oklahoma	933,760	430.480	45	659	2,437,132	3,685	8,779,623	466,172,040
% of Total	23%			32.8%				
Texas	613,760	149,760	28	232	820,000	3,530	5,310,999	128,462,405
% of Total	15%			11.6%	(Est)			
Total	4,070,820	1,311,760	34	2,003	5,304,316		27,330,163	1,579,098,866

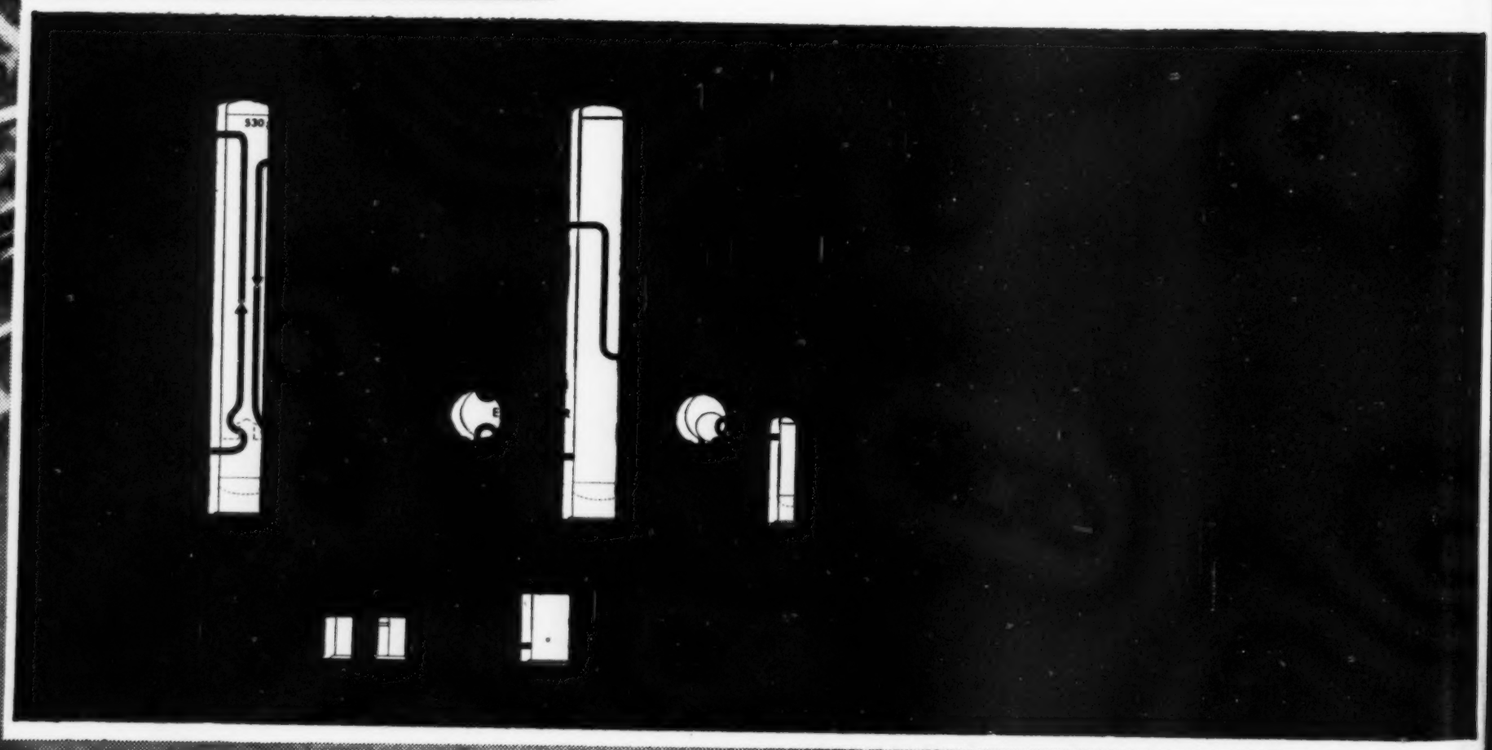




SOLUTION: THE FLUOR GLYCOL-AMINE GAS-TREATING PROCESS



EXAMPLE: LYTLE GASOLINE ABSORPTION PLANT AT COALINGA, CAL.



The Lytle Gasoline Absorption Plant at Coalinga, California, is a story of the Fluor Glycol-Amine Gas-Treating Process at work.

Expansion of natural gas supply through deeper drilling introduced into the Lytle Plant a natural gas so high in hydrogen sulphide content that it was no longer acceptable as commercial sales gas. After processing for gasoline recovery, the discharge gas was analyzed and found to contain 1.25 grains of hydrogen sulphide per 100 SCF and up to three-fourths of 1 mol per cent of carbon dioxide. Even though this gas was sufficiently pure for sale in many areas, in this particular instance requirements for commercial gas were set to *not more than 0.15 grains of hydrogen sulphide per 100 SCF...* a purity requirement so stringent that it would only be attempted by Fluor Gas Processing Engineers using the Fluor Glycol-Amine Gas-Treating Process.

Following study of the requirement by Fluor, a Research Department pilot plant was set to run at gas composition and operating conditions simulating those at the Lytle Plant. Here it was *proved* the Fluor Glycol-Amine Gas-Treating Process could meet—*and exceed by a comfortable operating margin*—the 0.15 grain per 100 SCF requirement efficiently, economically, and on a guaranteed basis.

The plant for the Lytle job was then designed on the findings of the Fluor Research Department. Engineering was set in motion, and a field construction schedule formulated.

The Lytle unit is a "sweet"-running unit paralleling laboratory and pilot plant findings—meeting its guaranteed performance with an adequate margin. This new installation raises the total installed capacity of Fluor Glycol-Amine Gas-Treating Plants to 585,000,000 SCF/D.

Fluor invites owners and operators of gas-producing properties to submit their gas-treating problems for study and recommendation by Fluor's Gas Processing and Research Engineers. Let them study *your* particular problem—the range of purity obtained through use of the Fluor Glycol-Amine Gas-Treating Process is virtually unlimited. It may be the low-cost answer to your gas-treating problem.

OIL STEEL CHEMICAL GAS

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been fixed by states as: Kansas, 15 trillion cu ft (51.7%); Oklahoma, 8.5 trillion cu ft (29.3%); and Texas, 5.5 trillion cu ft (19.0%).

Total pipeline withdrawals at the end of last October were 1,579,098,866 Mcf. By states:

Kansas	948,463,621
Oklahoma	466,172,040
Texas	128,462,405

Future gas reserves exceed 27 trillion cu ft.

Most of the gas production from Hugoton is taken by pipelines to markets. Locally the carbon black plants consume about 10% of the allowable. Pipeline purchasing companies, number of well connections, and September, 1948 gas purchases are shown in *Table 3*. Besides local markets in the three producing states, Hugoton gas is transmitted to Illinois, Michigan, Ohio, Nebraska, Iowa, South Dakota, Minnesota, Colorado, and Wyoming.

PIPELINE NEWS

TGT AND MINUTE MAN EYE NEW ENGLAND MARKET

FPC gives green light for Tennessee's line to Buffalo, but section to Boston still unapproved

Tennessee Gas Transmission Co. has obtained FPC authorization for its big $90,-million expansion plan which will extend its main line from northeastern Kentucky to Buffalo, N.Y., but the Houston firm must fight on to win the commission's okay for the extension from Buffalo to Boston.

Approval of the Kentucky-New York portion, slated to increase capacity to more than 1 billion cu ft daily, was granted following more than a year of hearings and studies of the adequacy of Tennessee's potential gas supply. The commission dismissed without prejudice the Buffalo to Boston proposal, and the company has submitted a separate application for continuance of the line.

The newly authorized facilities will bring additional natural gas to consumers in the Appalachian area, as well as to other customers along the line that runs from Texas through Louisiana, Arkansas, Mississippi, Tennessee, Kentucky, and West Virginia. As okayed by FPC the program includes construction of 450 miles of main line loops along the company's system; a 395-mile, 26-in. main pipeline from Kentucky to the Buffalo area; 325 miles of lateral lines, and additional compressor units aggregating 79,-800 hp.

Replacement of manufactured gas service in Ohio, New York, and six New England states is the aim of the additional $93,976,-000-project which would add 200 MMcf to the system's present transmitting capacity, bringing the total to 1260 MMcf daily upon completion of the project during the fall of 1950.

The proposed construction includes a 383-mile main line extension of Tennessee's pipeline system from the eastern terminus of the Kentucky-Buffalo pipeline in Erie county, New York, to a point in Massachusetts.

The program would also involve construction of 543 miles of looping along Tennessee's main line from San Salvador field (Texas) to a point near the Kentucky-West Virginia state line, installation of compression and lateral line equipment.

* * *

The race among pipeline companies for the lucrative natural gas business among 86 utilities in the New England area received a lively impetus recently when New England and Southwestern financial interests disclosed details of a plan that has received the approval of state officials in the area.

Sources close to the Minute Man Gas Co. revealed that officials of this recently formed $65 million pipeline company will seek approval of the Federal Power Commission shortly to begin construction of a 300-mile line that would begin at a point in Pennsylvania on one of the larger lines. The line, probably a 26-in. tube, would run up the west side of the Hudson river and cross the water at a point near the Bear Mountain bridge, then go on to Boston and Providence. There would also be 250 miles of lateral lines from the main line extending to markets in eastern New York and Connecticut.

PANHANDLE TARIFF HEARING POSTPONEMENT GRANTED

The FPC hearing involving Panhandle Eastern Pipe Line Co.'s proposed natural gas tariff and statements, suspended by the commission, has been postponed until Sept. 19.

The commission said it had received informal requests for the postponement, including one from the Illinois Commerce Commission, which said that current negotiations point to the probability that the issues involved may become clarified by the revised hearing date, if not solved altogether.

COMPRESSOR FOR CONTINENTAL

A 12-MMcf daily capacity compressor plant is scheduled to be built soon in DeWitt county, Okla., by Continental Oil Co., Sun Oil Co., and others.

The station, built to serve the Slick-Wilcox field, includes a complete gas-gathering system and will consist of four 600-hp units. Estimated cost is $1 million; work will be completed late this year.

JERSEY CENTRAL BIG INCH TIE-IN

September was the date set by the Federal Power Commission for the hearing involving Jersey Central Power & Light Co.'s proposal to construct a 39.4-mile natural gas pipeline in New Jersey connecting the company's Coast division system with the Big Inch.

The line, which will cost $1.2 million, would connect with the Big Inch near Bound Brook, N. J., and extend to Jersey Central's manufactured gas plant in Long Branch. Jersey Central proposes to enrich its manufactured gas with natural, for transmission to Monmouth and Ocean counties.

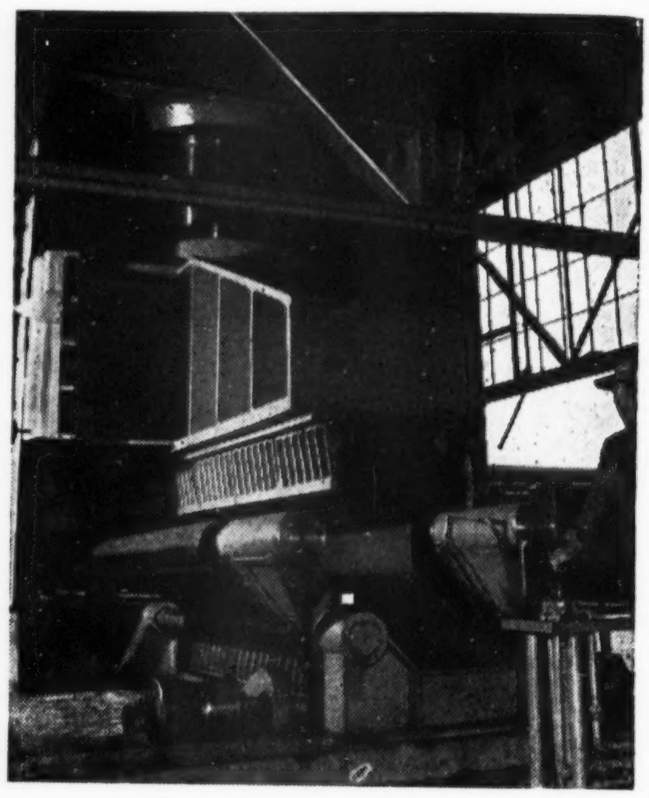
PLAN TO UP CAPACITY OKAYED

Kansas-Nebraska Natural Gas Co. Inc. has received FPC approval of a plan to construct new transmission facilities designed to increase the company's capacity to 140 MMcf daily, at an estimated cost of $2.339 million.

Included in the authorization: 14 town-border measuring stations, 301 miles of main, lateral, and loop pipelines, and new compressors with a total of 3600 hp.

Kansas-Nebraska said the facilities are needed to meet demands of its present markets and the following Nebraska towns: Hazard, Ravenna, Rockville, Beelus, Dannebrog, St. Paul, Burwell, Ord, Sargent, Comstock, Arcadia, North Loup, and Scotia.

Dwarfing the Big Inch



The main press at the Napa (Calif.) plant of the Basalt Rock Co. (shown above) will play a big role in the immense task of producing giant pipe starting next year. A new manufacturing agreement between Basalt and Kaiser Steel Corp., announced last month, will add equipment to the Basalt facilities enabling it to produce steel pipe for the oil and gas industry up to 36-in. diameter.

The new pipe, the largest yet, is to be produced in 40-ft lengths and in accord with ASTM-API specifications and will be marketed by the Kaiser Steel sales organization under the label "Basalt-Kaiser." Steel plate for the pipe wil be shipped to Napa from Kaiser's Fontana (Calif) integrated steel mill.

Installation of a Yoder electric welding unit will make possible the production of the expanded electric fusion weld steel pipe. Kaiser is also adding to pipe-making facilities at Fontana, and when the two companies complete their expansions, they will be able to offer the industry pipe ranging in size from ½-in. to 36-in.

PROTECTION SERVICE
Covers Every Pipe-coating Need

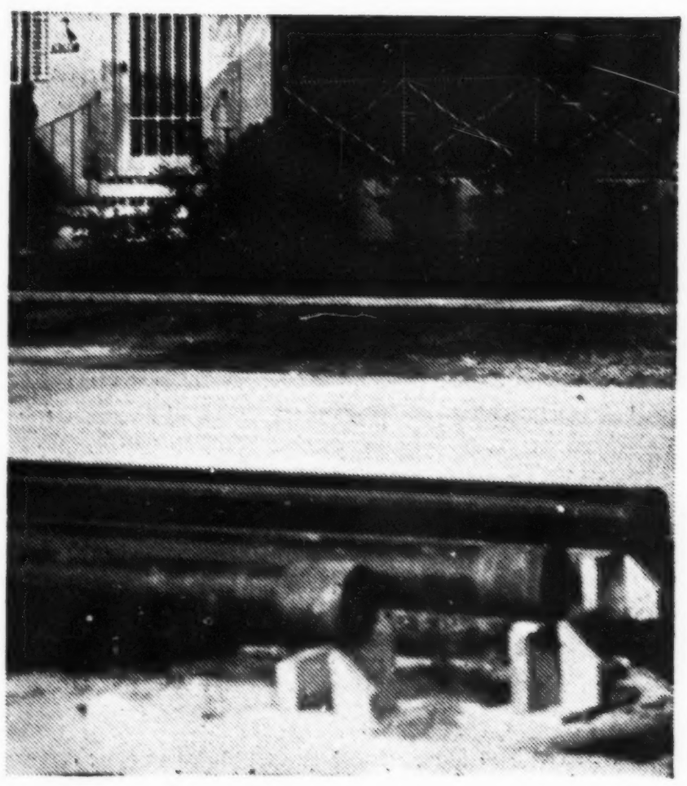
Materials and Application Procedure for:

1. Water Industries
2. Natural Gas, Crude Oils and Products Transmission
3. Professional Application in Plants and Yards
4. Distribution Systems
5. Reconditioning Operations
6. Gathering Systems
7. Recycling Operations

Materials and Application Procedure for

DISTRIBUTION SYSTEMS

Because of the high cost of distribution pipelines, their relative inaccessibility for repair, and the inherent possibility of leak hazards, it is imperative that only the finest coatings be used for their protection. Barrett* Enamels are ideal for such use. Their great flexibility and ductility enable them to withstand the flexing of the pipe. They also resist wide extremes of heat and cold without cracking. This latter quality is highly important when pre-coated pipe is bought and stored on skids until needed. The Barrett organization will be glad to confer with you on any of your pipe coating problems.



Barrett* Coatings are also recommended for protecting joints after sections of the pipe have been welded together.

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ALLIED CHEMICAL & DYE CORPORATION
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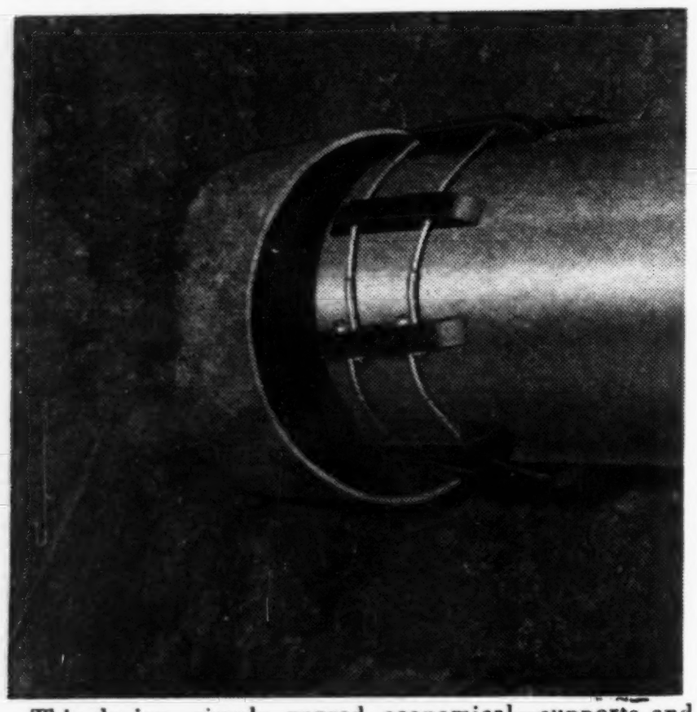
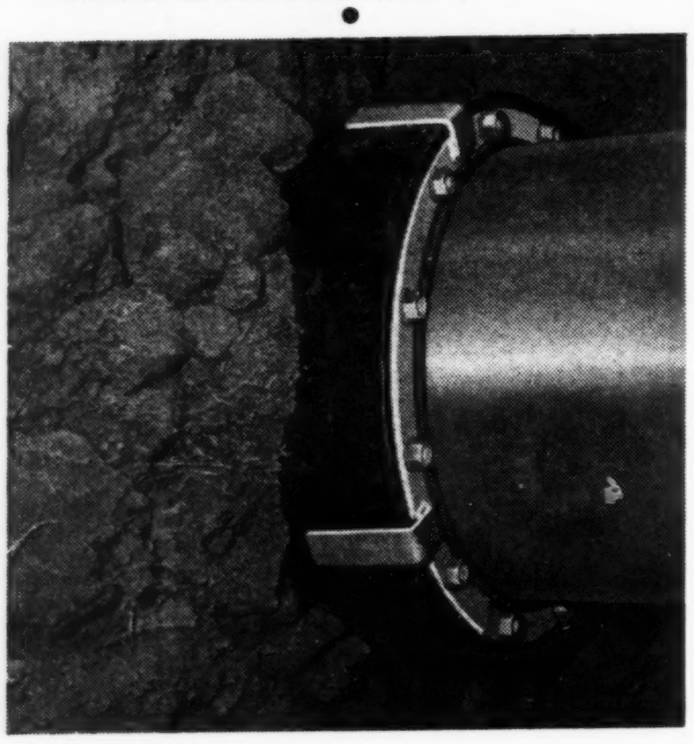
PROTECT YOUR PIPE LINE with Williamson Pipe Line CASING INSULATORS*



This device—simple, rugged, economical—supports and guides the leading end of coated line pipe into the right-of-way casing under railroads and highways.

Additional Casing insulators, clamped around the pipe every 20 to 30 feet, serve three purposes.

1—To protect the pipe coating.
2—To act as pipe skids, facilitating installation.
3—To separate pipe and casing, assuring permanent insulation for cathodic protection.



WmSEAL CASING BUSHINGS*

Equipped with exclusive T-gasket for positive watertight seal and insulation of pipe from steel flanges, this improved "casing seal" is designed for easy installation at each end of pipe-line casing under right-of-way crossings.

WmSEAL Casing bushings are readily installed because they offer:

- Large center hole for loose fit around coated pipe.
- Generous clearance inside of casing before bolts are tightened.
- Easily opened after removal of only one bolt, for closing around installed pipe line. WmSEAL Casing Bushings are widely used as wall sleeves for valve boxes, manifolds, etc.

*Patents Pending.

ALBERTA RESERVES TERMED "INSUFFICIENT"

Needs of province must be met before requests for export will be considered, says premier

Insufficient reserves of natural gas exist in Alberta, Can., to permit export, according to Premier Manning. In a recent announcement at Edmonton, the premier said no application for export of gas under the government's new controls legislation will be considered until the government is satisfied there is enough to meet the needs of Alberta.

"The government's first and foremost responsibility is to protect the interests and welfare of the people of this province and we are determined to carry out this responsibility to the best of our ability.

"To this end, no application for the export of natural gas will be given favorable consideration until such time as the government is satisfied beyond question that under sound conservation and proration practices there are sufficient gas reserves to meet the present and future domestic and industrial requirements of the people of this province.

"This condition definitely does not exist at the present time and is not likely to exist for some time to come."

The statement was clarification of various government statements during a special session of the Alberta legislature two weeks ago. At that time, the government brought in legislation which closely controlled the amount of gas which could be taken from the ground. The laws, passed over bitter opposition attacks, granted the province's Petroleum & Natural Gas Conservation board the right to issue a gas export permit with cabinet approval.

West Coast Transmission Co. will go ahead with its plans for a gas pipeline from Athabaska to Vancouver, despite the statement by Premier Manning. Company president, Frank M. McMahon said, "We think our development program in the Athabaska district will prove to the Alberta government that surplus gas exists for export. We have four rigs drilling wells in the Athabaska area and several other companies are carrying out a development program. Geological and engineering prospects are favorable to large gas output."

MICHIGAN-WISCONSIN TO UP CAPACITY 27 MMCF DAILY

A 27-MMcf daily increase in the capacity of Texas-Michigan pipeline, bringing it to a total of 155 MMcf, has been authorized the Michigan-Wisconsin Pipe Line Co. by FPC. The line, presently under construction, will serve communities in Missouri, Iowa, Wisconsin, and Michigan, including the Detroit area, with the additional capacity approved.

Michigan-Wisconsin had asked that the capacity be increased to 204,500,000 cu ft per day, but the FPC ruled that such an increase would be gambling on the amount of gas available annually for sale by the company. Replacement of some pipeline, new lines for distribution in the market areas, and additional compressor facilities were authorized in the FPC order.

NEW FIRM SEEKS PERMISSION FOR TEXAS-ILLINOIS LINE

Texas Illinois Natural Gas Pipeline Co., a newly formed subsidiary of Peoples Gas Light & Coke Co. (*GAS* Pipeline News, August 1949), has taken to FPC its request for the okay to build a $100-million, 1018-mile line from a "yet undetermined point" near Houston, Texas, to a point of terminus of the lines of Natural Gas Pipeline Co. of America, near Joliet, Ill.

The company said it expects to make sales of gas directly to companies now buying from Chicago District Pipeline Co. and its parent, Natural Gas Pipeline Co. of America. The pipe would be 30-in. diameter; it would be started by October 1950 and completed by November 1951.

TWO COMPRESSORS FOR BLYTHE

One unit has already been installed and the second will be in and operating next month, at the Blythe compressor station of SoCal Gas Co. The two new, 1760-hp, Clark gas-driven units, which will build the station's capacity to an ultimate 405 MMcf daily, join seven smaller (1600-hp) units already operating at the station. (*GAS*, March 1949, p. 33).

The first of the two new units (the eighth at Blythe) will bring the capacity up to 365 MMcf, and is already in operation. Both units were shipped from the Clark plant in Olean, N.Y.—complete, they weigh 90 tons each.

Operation Rescue

When Petersburg, W. Va., fell victim to the Potomac valley flood that deluged the territory this spring, employees of the H. C. Price Co., headquartered near the town during work on the 26-in. line to Baltimore, Md., that the company is constructing for Atlantic Seaboard Corp. and Virginia Gas Transmission Corp., were right on the job as rescue workers.

Petersburg suffered some 24 in. of rainfall in approximately 36 hours—and for a day and a half, the small community was completely isolated. Price Co. crews, working with heavy pipelaying equipment, fell quickly to the job of aiding the stricken town, furnishing much-needed power and radio service with portable generators, rescuing marooned families in high-water area, and clearing debris and wreckage from roads and highways. The Pricemen, 250 strong, were directed in their efforts by Supervisor Charley Ice.

After flood waters receded, Petersburg citizens were of one accord as to who had been the greatest single aid in battling nature's tantrum: the Oklahomans who had come to their country to lay natural gas pipeline. The "Grant County Press," Petersburg's newspaper, was prompt in commending Mr. Ice and his crew for their valuable rescue work; the "Bartlesville Examiner-Enterprise," Price Co.'s "home town newspaper," added its plaudits a few days later.

Despite the wettest summer in Mississippi and Alabama in many years construction of the 30-in. natural gas carrier for Transcontinental Gas Pipe Line Corp. from the Rio Grande valley in Texas to New York City was still on schedule last month. The rain-filled ditch and dense forest cover are typical of this year's operations.

GULFCOAST TEXAS-ILLINOIS LINE APPLICATION DISMISSED

Because the applicant company failed to prosecute the case, FPC has dismissed an application of The Gulfcoast Northern Gas Co. to build a 1184-mile gas pipeline from Texas to Illinois, to sell gas in the Chicago area through the Natural Gas Pipeline Co. of America.

In dismissing the application, which was filed in August 1948, FPC noted that Gulfcoast, in response to a commission inquiry this spring, clearly indicated that it did not intend to prosecute the application in its existing form, but was rather engaged in negotiations for the sale of the gas to other companies in the Chicago area, excluding Natural Gas Pipeline. The company said further that it would file amendments to the original petition—this it has failed to do, nor has it made indication of doing so.

The proposed line would have cost $119 million and would have had an initial capacity of 245 MMcf and an ultimate capacity of 350 MMcf.

VIRGINIA EXTENSION REQUESTED

Commonwealth Natural Gas Co. (Lynchburg, Va.) has filed an amended application with the Federal Power Commission for authorization to build a 200-mile natural gas pipeline to carry gas to utility companies and domestic and commercial customers in Virginia.

The line, to be built at an estimated cost slightly above $5 million, would extend from a point of connection with Virginia Gas Transmission Corp.'s pipeline in Green county southeasterly to the vicinity of Norfolk. Commonwealth intends to purchase its entire gas supply from Virginia Gas.

Prospective customers listed by the company in its application include The Petersburg & Hopewell Gas Co., Virginia Electric & Power Co., Portsmouth Gas Co., Suffolk Gas Co., and the cities of Richmond and Charlottesville—all of which now distribute manufactured gas.

A similar application, asking permission for construction of facilities that would serve approximately the same area, is on file with FPC with Virginia Natural Gas Co. as the petitioner.

IROQUOIS RUSHING STORAGE TO MEET WINTER PEAKLOAD

Iroquois Gas Corp., Buffalo, N. Y., anticipates having 4 billion cu ft of natural gas in its storage field near Zoar Valley and Collins, N. Y., before winter peakload demands are felt, Olin F. Flumerfelt, company president, has reported.

The reserve supply, largest in the company's history, is being built up as fast as the fields can absorb it, Mr. Flumerfelt said. At present, about 2.7 billion cu ft are underground. The storage fields have been enlarged and a new pipeline to Buffalo has been approved by FPC.

THREE APPLICATIONS LACK FACTS

Three natural gas pipeline companies proposing to serve markets in the southeastern states have been ordered to comply with an FPC ruling governing the filing of applications for certificates of public convenience and necessity.

In all three cases the applications now on file are deficient in supplying necessary information and exhibits.

Piedmont Natural Gas Corp., Southern Natural Gas Co., and Atlantic Gulf Gas Co. were given time limits of 30 days (for Piedmont) and 10 days (for the other two) to comply with the order.

UNITED ASKS POSTPONEMENT

At the company's request, FPC has postponed the Aug. 8 hearing in regard to a commission investigation of rates charged by United Natural Gas Co. until Sept. 19.

NORTHERN NATURAL REJECTS TRUNKLINE TO EXPAND OWN LINES

Northern Natural Gas Co. will seek permission to increase its own pipeline facilities rather than contracting with Trunkline Gas Supply, President B. R. Bay has announced.

At a recent meeting of the board of directors of the company, a motion to enter into a proposed contract with Trunkline was defeated. Instead, the company's officials voted to apply to FPC for permission to increase capacity of its lines to 550 MMcf in 1950 and to 700 MMcf in 1951. Originally, the company had intended to increase its capacity to an ultimate 530 MMcf by 1950.

Northern Natural's decision was made in the opinion that it could serve its customers in Nebraska, Iowa, Minnesota, and South Dakota cheaper by upping its present capacity than by entering into the agreement with Trunkline.

Trunkline's 711-mile project—a line from Edge, Texas, to Palmyra, Nebr.—was authorized by the FPC last May. Also okayed as part of the plan were 810 miles of lateral supply lines, and seven compressor stations with an aggregate of 44,800 hp.

Rates to be charged by Northern Natural for Trunkline gas have been under discussion ever since the application was made. At the final FPC hearing, a spokesman for Northern Natural customers questioned commissioners as to whether the utility would include gas delivered on the new Trunkline system in its existing rate schedule or charge a separate list of prices. FPC declined to rule on the question, since that controversy was not part of the approval proceedings.

PIPE SHORTAGE BLAMED FOR SECOND EAST TENNESSEE DELAY

Authorization has been granted East Tennessee Natural Gas Co. to delay construction of its FPC-approved pipeline in central and eastern Tennessee.

The FPC delay authorization is the second granted to the company—both have hinged upon the inability of East Tennessee to acquire sufficient steel pipe for the project. Under the latest commission order, construction is to start no later than April 1, 1950.

The $11.4-million project will consist of 186 miles of line extending from the Tennessee Gas Transmission Co.'s system in the northwestern part of the state to the Chattanooga area, and a 112-mile line extending to Knoxville.

INTERRUPTIBLE SERVICE ADDED

Texas Eastern Transmission Corp. may deliver and sell, on interruptible basis, surplus natural gas to gas utility companies which are authorized firm purchasers, and install equipment necessary to make the deliveries, according to a recent FPC decision.

The supplies, according to Texas Eastern, ranging from about 60 MMcf in July to 24 MMcf in October, are the result of lessened demand by customer companies. Concerns not authorized as Texas Eastern customers may not buy the surpluses, authority for which was requested by the company in its application.

Another Example of Efficient Power at Lower Cost

In 9 years...

91,900 GMV horsepower on El Paso Natural's system

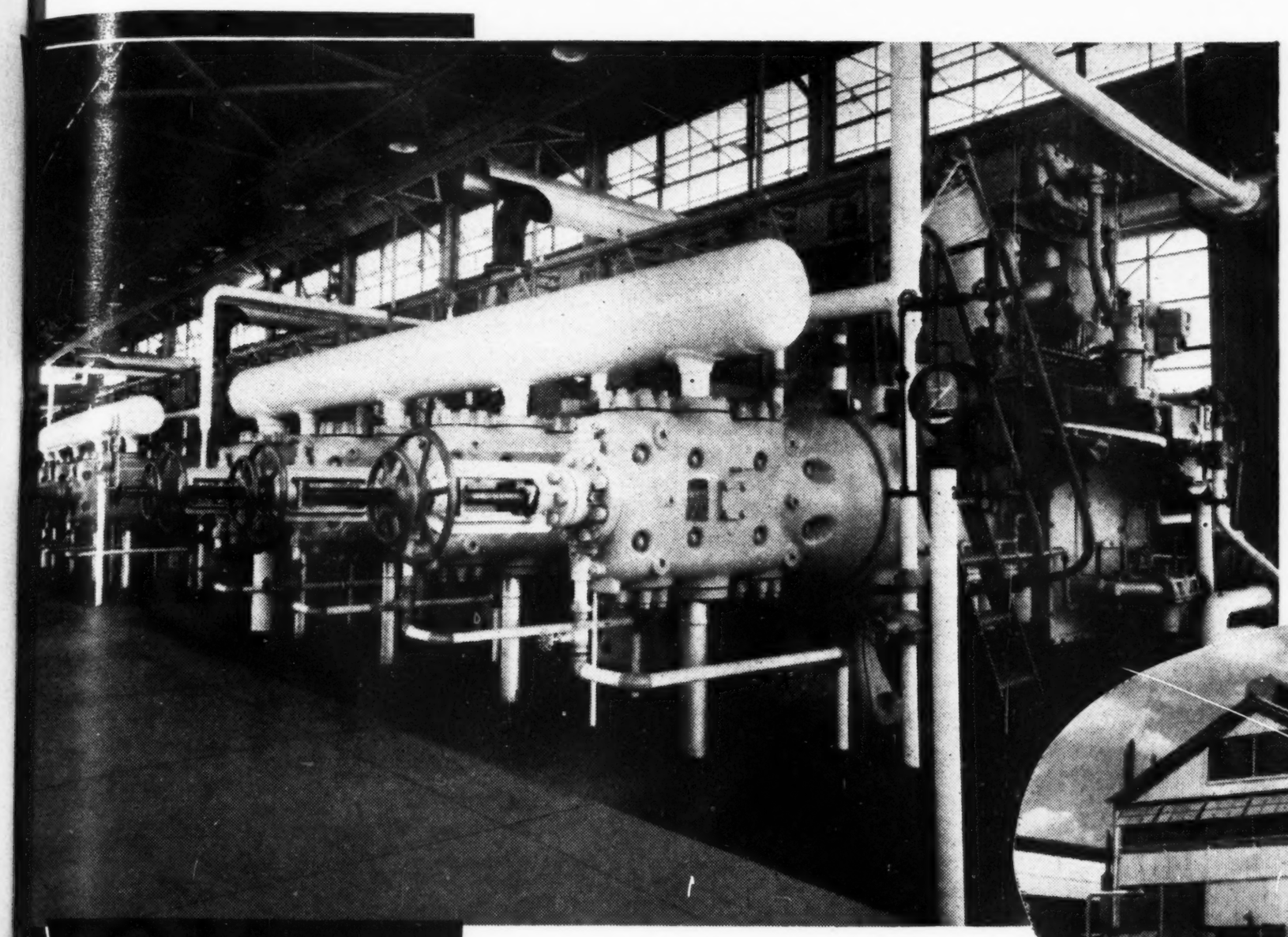
El Paso Natural Gas Company's first GMV's were installed in 1940, making this company one of the first to "take a chance" on a new idea in compressor design. Since then the record speaks for itself—91,900 GMV horsepower installed to date . . . and still more on order.

Nor are these GMV's limited to one kind of service. They're used on the main lines, in field gathering service, for refrigeration service in gasoline extraction, for residue gas service and for repressuring. GMV's have always been known for their versatility.

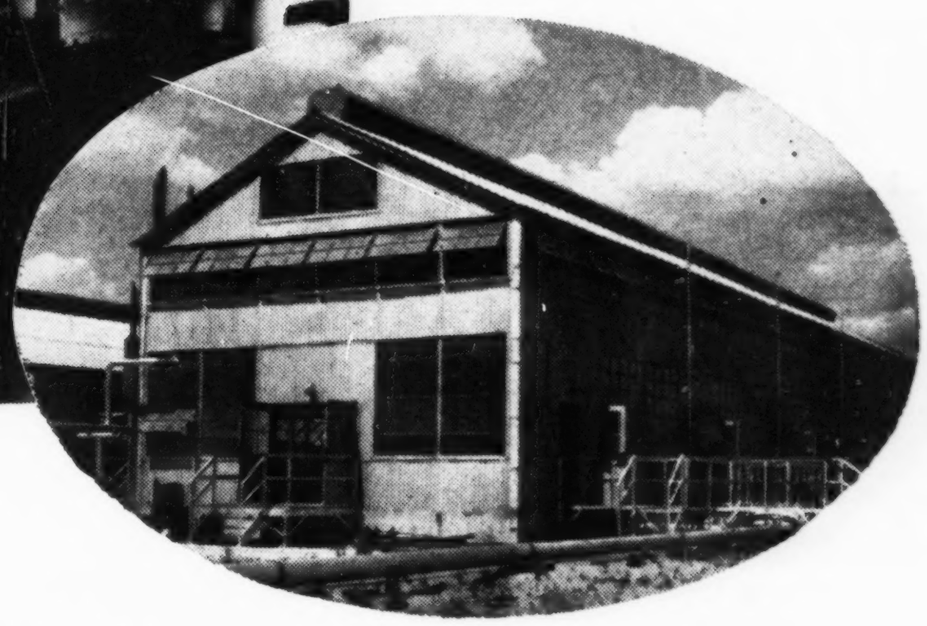
Wherever you go, wherever you check, you'll find a keynote of satisfaction in GMV performance—the result of combining in this modern unit those qualities most desired in compressor service. That's why companies like El Paso Natural turn again and again to modern Cooper-Bessemer V-angles as their needs expand.

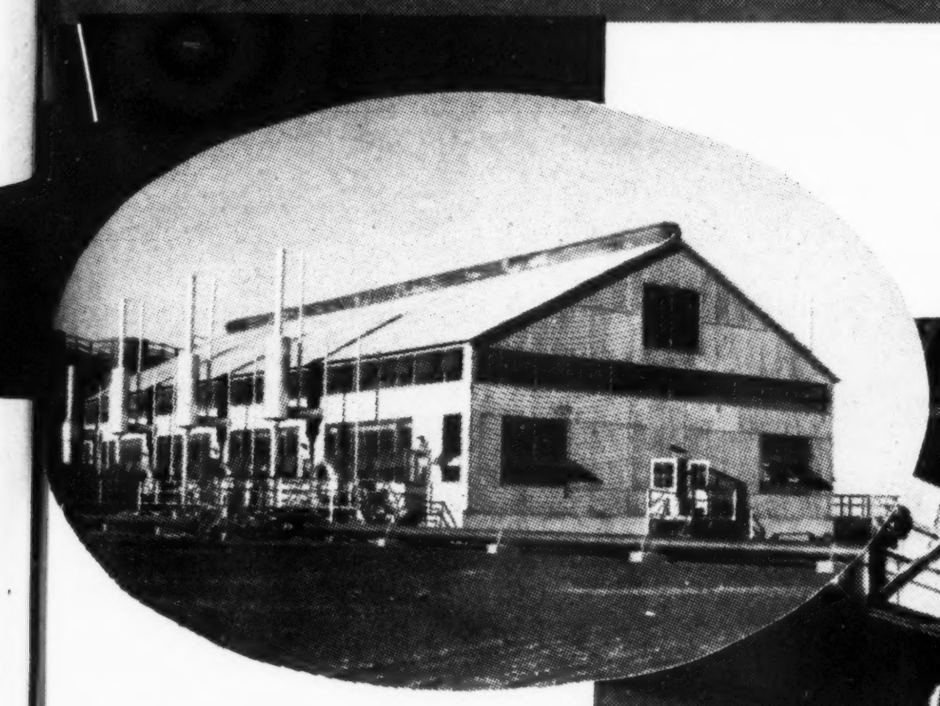
Compressors

New York Washington Bradford, Pa. Parkersburg, W. Va. San Francisco, Cal. Seattle, Wa

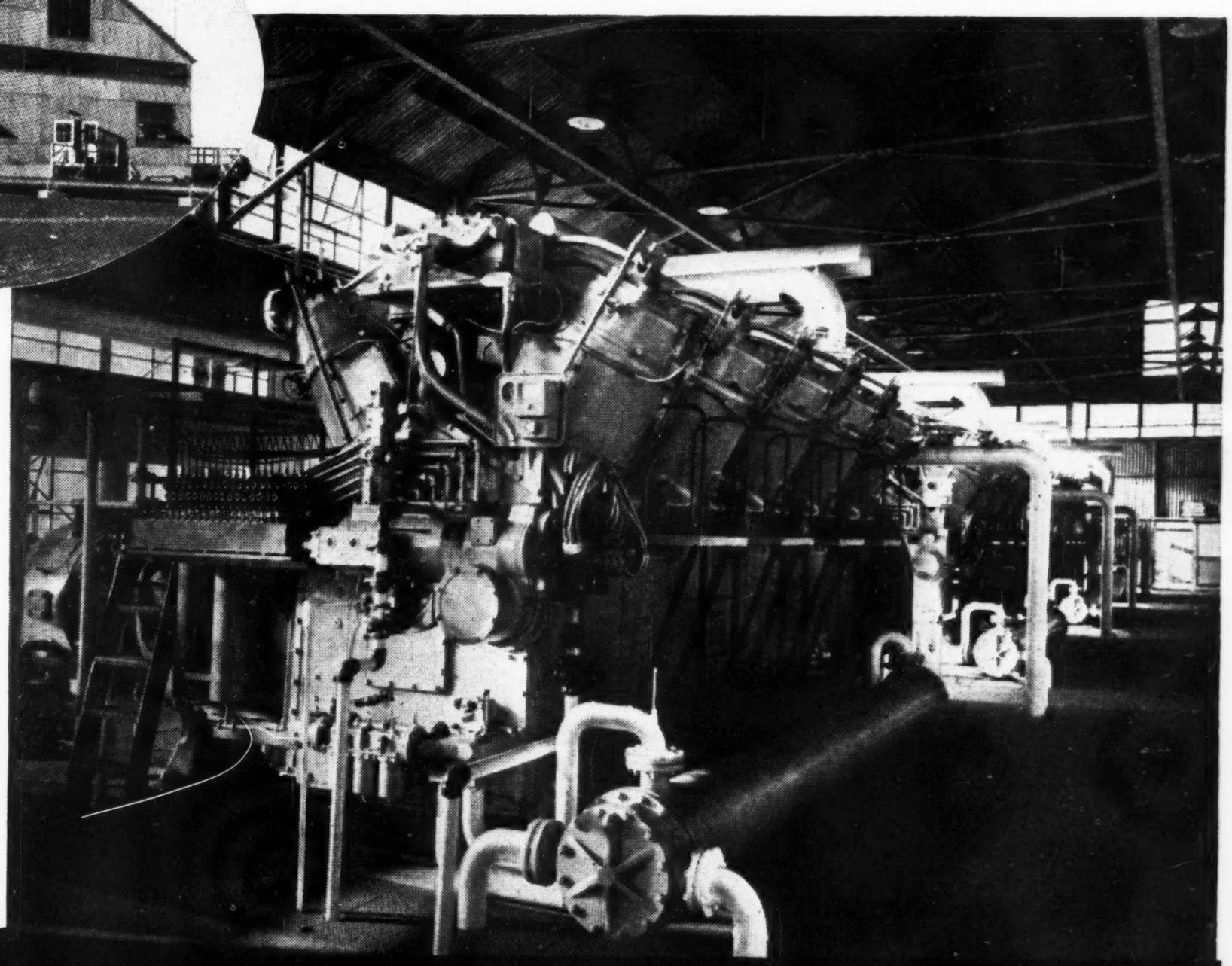


El Paso Natural's Kermit station, containing 7 GMV 8-cylinder V-angles totaling 5600 compressor hp. Each drives 4 double-acting compressor cylinders, one for each crankthrow. Three piston-type variable unloaders per unit allow even loading throughout pressure range.





El Paso Natural's Fullerton station, containing 6 GMV 10-cylinder V-angles totaling 6,600 compressor hp. Each unit has 4 compressor cylinders for 2-stage compression from 40 to 600 psi.



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EL PASO WANTS EXTENSIONS

El Paso Natural Gas Co. has applied to the Federal Power Commission for authority to construct pipeline facilities to serve natural gas to the U. S. Army's White Sands Proving grounds, Holloman Air Force base, and the town of Alamogordo, all in New Mexico, and to Willcox, Ariz. In addition, the proposed line would increase deliveries to Phoenix by 9 MMcf daily.

A total of 93.1 miles of pipeline, and meters and regulating stations would be needed to complete the project, cost of which is estimated at $690,630. Initial daily capacity would deliver 1.5 MMcf daily to White Sands, 1.85 MMcf each to Holloman and Alamogordo, and 84 Mcf to Willcox.

White Sands and Holloman both use oil for fuel at present, and Willcox and Alamogordo use manufactured gas.

NAVY REPORTS NEW GAS WELL

Commercial quantities of natural gas have been discovered near Point Barrow, Alaska, according to reports of the U. S. Navy, which has been searching in the 37,000-acre Naval Petroleum Reserve No. 4 for gas and oil.

The natural gas well, drilled some six miles north of Point Barrow, has been named South Barrow No. 2. The gas is flowing in sufficient quantities to meet requirements of the naval installations at Point Barrow.

HUGOTON PLANS 1950 DELIVERIES

Hugoton Production Co. expects to deliver to Kansas Power & Light Co. in 1950, under a contract entered into last October, 15 billion cu ft of gas, or a daily average in excess of 40 million cu ft. Larger volumes will be delivered by Hugoton in succeeding years.

The contract provides a minimum price of 12 cents per Mcf. Hugoton retains the right to extract hydrocarbons from the gas, which will require the construction of a gasoline plant. Deliveries of gas are expected to begin before the end of this year.

The company has completed 27 producing wells on its leases, and expects to have 36 in the near future. Initially Hugoton will develop its gas leases and construct facilities needed in connection with its contract with Kansas Power & Light, but later may engage generally in the oil and gas business. Negotiations are under way for a loan to finance drilling of gas wells and related operations which will require approximately $3 million.

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TEXAS-CALIFORNIA GAS
TRANSMISSION LINES

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- Lubricated Stainless Steel Valve.
- Non-Metallic Sealing Orifice Plate.
- Every part renewed or repaired without removing from the line.

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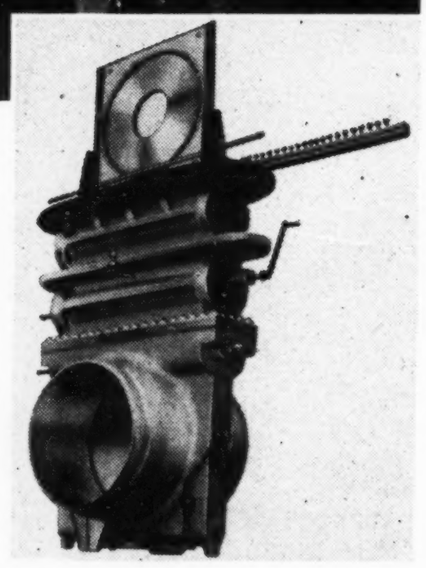
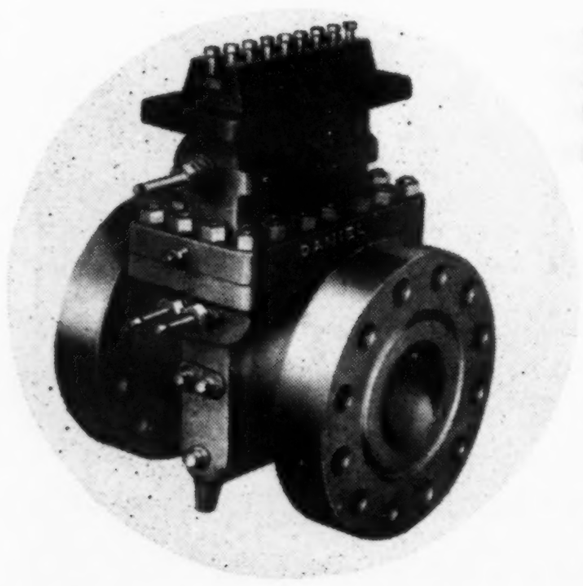
Illustration at right shows a DANIEL 30" 600 lb. A.S.A. (1000 lbs. C.W.P.) fitting being installed in the field for main line measurement. This DANIEL fitting is the largest high pressure orifice fitting ever manufactured. Made of alloy steel it has a stainless steel orifice plate ½" thick.



Total weight 9750 lbs. All the Orifice Fittings in these lines are being supplied by DANIEL.



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Progress Reports

CITIES SERVICE OIL CO. is building gathering lines at its Burrton plant in Kansas. Work will be completed Sept. 30 by B&B Contracting Co.

ALABAMA-TENNESSEE NATURAL GAS CO is building a 155-mile line from Selmer, Tenn., to Huntsville, Ala. Lehman, Hoge and Scott is the contractor on the job which is broken down into three sections: 10¾-in. line from Selmer to Muscle Shoals, Ala. (75 miles); 8-in. line from Muscle Shoals to Decatur, Ala. (45 miles); and 6-in. line from Decatur to Huntsville. Line to be completed in January, will connect with Tennessee Gas Transmission Co.'s 24-in. line.

TRANSCONTINENTAL GAS PIPE LINE CORP. reports the following progress on its 1840-mile line from Texas to New York:

Spread 1: 67 miles being built from Eunice, Miss., to Mississippi river by Morrison Construction Co., Austin, Texas.

Spread 2: 112 miles from Mississippi river to Highway 42 in Mississippi by Morrison.

Spread 3: 110 miles from Highway 42 to Tombigbee river in Alabama by Wunderlich & Griffis Construction Co., Tulsa.

Spread 4: 112 miles from the Tombigbee river to Coosa river in Alabama by Midwestern Constructors Inc., Tulsa.

Spread 5: 110 miles from Coosa river into Georgia, also by Midwestern.

Spread 6: 112 miles in Georgia by Williams Brothers Corp., Tulsa.

Work has also begun on five main compressor stations in Louisiana, Alabama, Georgia, North Carolina and Virginia.

Three river crossings are being built by Omaha Dredge & Dock Co. and L. E. Farley Inc. across the Tombigbee river (Alabama), Pearl river (Mississippi), and Mississippi river (Louisiana).

Progress on the 1949 program as of Aug. 2 included 98 miles in ground; 416 miles of 30-in. pipe shipped by fabricators; 142.3 miles doublejointed.

TENNESSEE GAS TRANSMISSION CO., Houston, reports the following progress during the month ending Aug. 7:

20 miles on the line from Ruleville, Miss., to the Mississippi river—H. C. Price Co., contractor. To be completed in third quarter of September. 23 miles from near Spring, Texas, to Trinity river. Estimated completion date: first quarter of September. Contractor: Morrison Construction Co. 13 miles from near Arkansas-Louisiana state line to near Monroe, La., completed during August by company crews.

PHILADELPHIA ELECTRIC CO. reports that progress on its spreads (see August *GAS*, p. 96) as of Aug. 1 was as follows: Spread A: 44% complete; Spread B: 30% complete; Spread C: 25% complete; Spread D: 25% complete. A through D will probably be finished Nov. 1; E is scheduled for completion Dec. 1.

TEXAS EASTERN TRANSMISSION CORP. reports that 78 miles of a total of 170 miles of 26-in. loop line along the Big Inch in Ohio has been completed. When finished, the looping will bring Texas Eastern's capacity up to 740 MMcf per day. Nov. 1 is the completion date scheduled for Spreads 5, 6 and 7. Nos. 5 and 6 from Crooksville to Lebanon, Ohio, are being built by Associated Pipe Line Constructors Inc. and No. 7 from Woodsfield to Crooksville is being handled by Williams Brothers.

INTERSTATE NATURAL GAS CO. is laying 29 miles of 22-in., 20-in., and 16-in. natural gas line west of Baton Rouge, La. Latex Construction Co., with F. A. Silar as superintendent, is at work on the job.

TEXAS PIPE LINE CO. has 65% of the work completed on four pipeline pump stations at Lindsay, Okla.; Haskell, Colorado City, and Odessa, Texas. J. B. Latham is supervising the job for Latex Construction Co.

ARKANSAS LOUISIANA GAS CO. has Latex Construction Co. working on two spreads to build 91 miles of 20-in. line from Magnolia to Malvern, Ark. Work started this month.

TEXOMA NATURAL GAS CO., Tulsa, is adding to facilities of its gas compressor station and dehydration plant, Station No. 21 (Fritch, Texas). Midwestern Constructors Inc. of Tulsa has J. A. Bard supervising the job.

NORTHERN NATURAL GAS CO. is building 62 miles of 20- and 24-in. line near Garden City, Kan., on the Panhandle-to-St. Paul line. Work, by R. H. Fulton & Co., started Sept. 1. There will be one river crossing near Oakland, Iowa.

The company reports completion last month of 26.47 miles of 24-in. line north of Ventura, Iowa, by G. G. Griffis and 29.5 miles of 24-in. line northeast of Palmyra, Nebr. by Eastern Construction Co.

Tulsa Pipe Coating Co. is coating 70 miles of 24-in. loops from Fort Dodge, Iowa, to St. Paul, Minn., and reported the work 85% completed. W. F. Secrest is in charge of the job.

CARTER OIL CO. has the B&B Contracting Co. at work on gas gathering lines near Carter Dunne plant, Okemah, Okla. Work is about 50% completed.

PACIFIC GAS & ELECTRIC CO. has Pacific Pipeline and Engineers Ltd. (El Cerrito, Calif.) laying 20 miles of 30-in. high pressure gas main between Irvington and San Leandro, Calif. Job, which is under supervision of C. P. Hamilton, was completed Sept. 1.

REPUBLIC NATURAL GAS CO. has completed 6 miles of 4- and 6-in. gathering lines in Hugoton field. Knupp Construction was the contracting company.

MICHIGAN-WISCONSIN PIPE LINE CO. has reported 105 miles of pipe lowered in on its spread No. 1, 84 miles of pipe in on spread No. 2, 120 miles of pipe in on spread No. 3, and 103 miles of pipe in on spread No. 4. All spreads will be completed in May 1950.

TEXAS GAS TRANSMISSION CORP. has the following work under way by N. A. Saigh Co. Inc. of San Antonio:

Multiple crossing of the Mississippi river near Greenville, Miss., consisting of four 16-in. 15,000-ft natural gas lines. Work began Aug. 1.

103 miles of 20-in. line from Carthage, Texas, to Sharon, La. Work started Aug. 15.

Omaha Dredge & Dock Co. and L. E. Farley Inc. are building crossings of the Tennessee and Cumberland rivers, both in Kentucky.

GREAT LAKES PIPE LINE CO. completed 5 miles of 4-in. line near Independence, Kan., last month. Jayhawk Construction Co. did the job.

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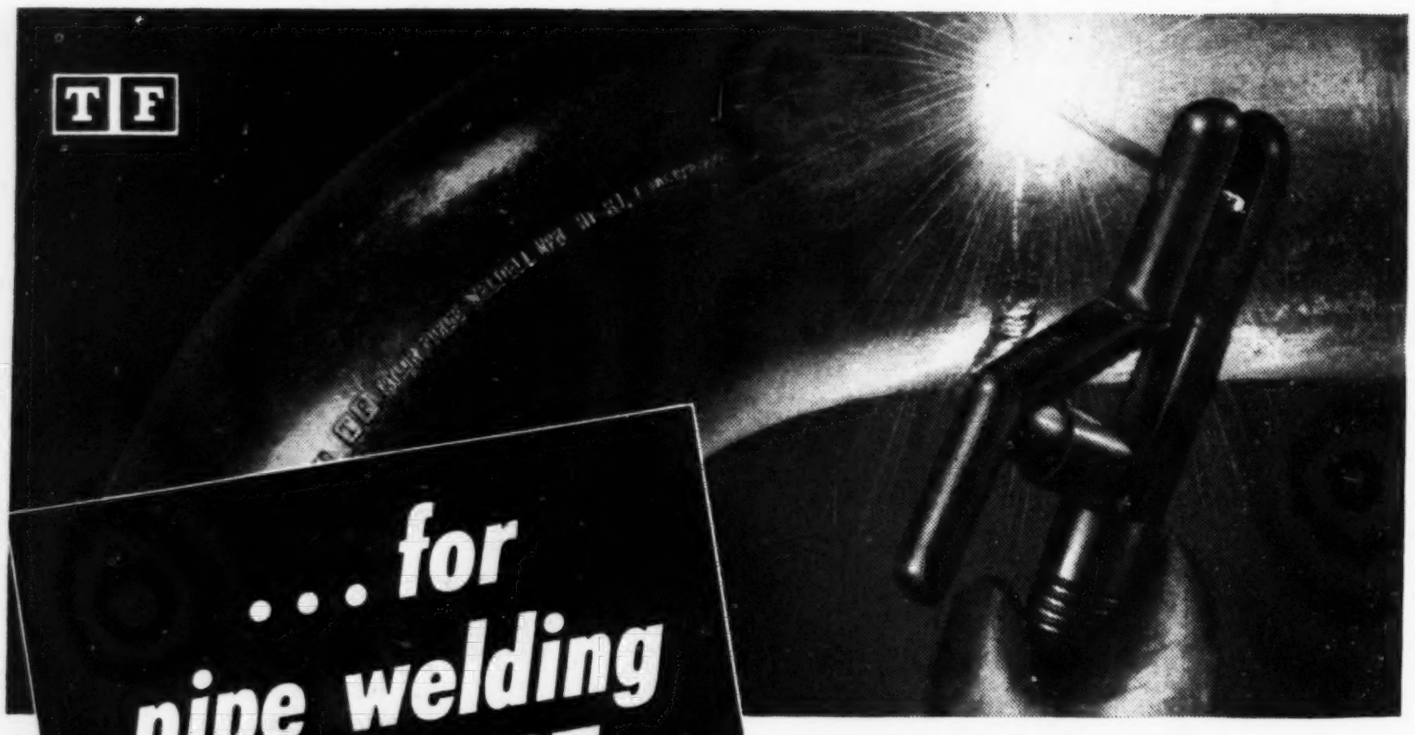

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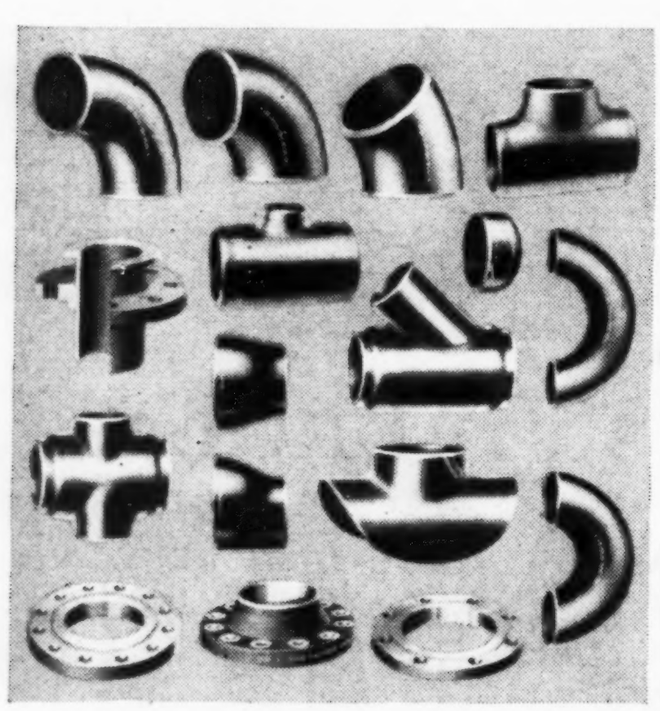

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WRITE FOR COMPLETE DETAILS

THE GOLDAK CO. 1542 W. GLENOAKS, GLENDALE 1, CALIFORNIA

STANOLIND OIL & GAS CO. has the following work being done by Deaton & Sons Inc. (Odessa, Texas): 80 miles of 2- to 20-in. gathering line in Fullerton field, Texas, and 135 miles of 2- to 30-in. gas gathering system completed last month at Levelland, Texas. W. F. Deaton is spread manager.

CITIES SERVICE GAS CO. has R. H. Fulton at work on 130 miles of 26-in. natural gas line from Sterling, Kan., to Ottawa, Kan. Job will be completed Sept. 15. Cities Service has completed a gathering line system in Hugoton field. Knupp Construction Co. Inc. was contractor.

MICHIGAN GAS STORAGE CO. has completed 61 miles of 20-in. line from Freedom Station to Ovid, Mich., and 14 miles of 14-in. line from Laingsburg Junction to Lansing, Mich. This completes the 1949 program.

WEST TEXAS GAS CO. will have completed by Sept. 15 14 miles of 8⅝-in. line from Odessa, Texas, to Goldsmith compressor plant (El Paso Natural Gas Co.). Western Construction Co., of Hobbs, N.M., was contractor on the job.

MICHIGAN CONSOLIDATED GAS CO. has Somerville Construction Co. (Ada, Mich.) at work on 15 miles of 20-in. line from Austin gas storage field to Goodwell gas field (Michigan)—to be completed Sept. 10. Somerville is also building 22 miles of 12-in. line for Michigan Consolidated from Milford to Ann Arbor, Mich.—starting Sept. 1, finishing Oct. 1.

DOW CHEMICAL CO. is building 56 miles of 8-in. line from Bauer Creek field to Loomis, Mich. Job, starting Aug. 15, will be completed Nov. 1 by Somerville Construction Co.

Pipeline People

HERBERT H. WALTHER JR., sales engineer for Dowell Inc. in Richmond, Va., has been promoted to development engineer and the Richmond sales outpost has been enlarged to a station. The Tulsa, Okla., firm also has established a new station at Sullivan, Ind., where B. E. McCANN is in charge. MARVIN E. JOHNSTON, LARKIN L. BLAKE, and CLARENCE R. OLSON JR. have been promoted to sales engineers by the company.

W. L. STANTON, petroleum engineer, recently was named to head Texas Gas Transmission Corp.'s new Shreveport office. For the past three years Mr. Stanton has been director of the Carthage field engineering committee at Carthage, Texas. The new office has been established in the interest of greater operating efficiency in the Louisiana-Texas area where the firm's supplies originate.

E. L. DeGOLYER, of DeGolyer & MacNaughton Co., Dallas consultants, and G. A. WILSON, president of Interstate Natural Gas Co., were among members of the Military Petroleum Advisory Board who received letters of appreciation from Secretary of Defense Louis Johnson for their assistance in studies to meet the needs of the armed services for petroleum in an emergency.